

PD-AAV-721

50360

Soybean Diseases in Colombia

Robert M. Goodman

ISR-80-12

June 1980

International Soybean Program, INTSOY

College of Agriculture
University of Illinois at Urbana-Champaign
113 Mumford Hall, Urbana, Illinois 61801 U.S.A.

College of Agricultural Sciences
University of Puerto Rico, Mayaguez Campus
Mayaguez, Puerto Rico 00708

International Soybean Program (INTSOY)
University of Illinois at Urbana-Champaign
Universidad de Puerto Rico-Recinto de Mayaguez

Trip Report/Colombia

Name of Traveller: Robert M. Goodman
Associate Professor, Plant Pathology

Dates of Travel: 28 April - 3 May, 1980

Itinerary: 28 April - Lima, Peru to Cali. Visit virology and plant pathology staff at Centro Internacional de Agricultura Tropical (CIAT) and Instituto Colombiano Agropecuario (ICA)/Palmira. Look at maize virus diseases in field at ICA and discuss plans for visiting soybean fields.

29 April - At CIAT. View bean virus research and discuss the CIAT bean pathology program. Present seminar on INTSOY, soybean viruses, and geminivirus research.

30 April - At ICA/Palmira. Visit several soybean fields to collect disease samples and see a machismo disease epidemic. In late afternoon, process soybean samples at CIAT lab, discuss plans for comparative work on SMV and bean common mosaic virus (BCMV) with Dr. F. Morales (CIAT).

1 May - Travel to Bogota. National Holiday. With Dr. Gerardo Martinez-L. visit farming areas north of Bogota. Sightseeing in and around Bogota.

2 May - Meet with Dr. David Schaer, USAID Mission Food and Agriculture Officer Bogota. Visit ICA plant virology lab and field plots of ICA station near Bogota.

3 May - Travel Bogota to Champaign.

Summary of Accomplishments:

The primary purposes of my visit to Colombia were to become familiar with soybean disease problems in the Cauca Valley and acquainted with the ICA staff members working on these diseases, to discuss with colleagues at CIAT their work on whitefly-transmitted viruses in tropical legumes, and to present a seminar for CIAT and ICA plant pathologists and others on the INTSOY program and INTSOY virology research.

Several thousand hectares of soybeans are grown each year in the rich, wide Cauca Valley of Colombia. Currently the major crop in the area is sugar cane. Other major crops include maize, cotton, and soybeans. Two principle soybean disease problems in the valley are the leafhopper-transmitted machismo disease and the aphid-transmitted soybean mosaic virus.

Machismo is caused by a mycoplasma-like organism (MLO) that is transmitted by Scaphatopius fuligenosus, a cicadelled leafhopper. Incidence of the disease seems to be correlated with increased populations of the vector, but it is not known for sure whether S. fuligenosa is the only or even the principle vector in the field. The disease, whose symptoms appear some 45 days after inoculation, results in serious yield losses, in part because few if any seeds are produced on infected plants and in part because the infected plants remain green long after the healthy plants in the field mature. Symptoms, in addition to delayed maturity, include gross proliferation of axillary shoots at nodes; small, often seedless pods borne erect; stunting; and

crenated pods containing one, if any, oversized seed. Plants with machismo disease produce essentially no yield. Because the symptoms usually appear during reproductive development of the crop, the loss in yield can be expected to be nearly directly proportional to the incidence of the disease in the field.

Machismo is most common when soybeans are planted at times other than the usual seasons which are March-June and October-January, that is, when harvesting is timed to occur at the usual planting times. However, in 1977 the incidence of machismo was high during the regular planting seasons. The reasons for the irregularity in the timing of epidemics of machismo are not known. Cooperative work on pathogen/vector relations is underway at ICA/Palmira and ICA/Bogota involving plant pathologists Dr. Jorge Victoria, Dr. Gerardo Martinez-L. and Ing. Francia V. de Agudela and ICA staff members in other disciplines.

The pathogen has a wide host range in other legumes (Phaseolus, Crotalaria) and other plants (Vinca, for example). In these plants, as in soybeans, it causes classic MLO symptoms. The possible relationships between the machismo organism and other MLOs are not understood.

No genetic resistance to machismo has been found yet in soybeans, but only a very limited search has yet been made. I suggested that the tropical soybean germplasm collection held by INTSOY should be brought to Colombia and planted in a location where, and at a time of year when, machismo incidence would be high to try to identify sources of resistance. Plans are being made with Dr. Jorge Victoria (ICA/Palmira) for this study.

The second problem in soybeans in SMV. The majority of the soybean growers in the Cauca Valley purchase their planting seed from seedsmen who specialize in growing the crop for seed purposes. The principle cultivars now grown in the Valley are Tunia, a recent ICA release (pedigree: Mandarin/ICA x Dortchsoy), Jupiter, Victoria (a selection from Jupiter), and Mandarin/ICA (a tropical selection from Mandarin). In Mandarin/ICA, Jupiter and Victoria especially, the incidence of seed coat mottling is increasing in seedlots produced for sale to growers. This situation alarms seedmen, growers and ICA. The incidence of SMV in production fields is not very high at the present time, but evidence from an experiment done in several valley locations by ICA staff showed 10% or more seed transmission and 30% or more virus incidence at the end of the season.

The SMV-suspect plants I saw in fields at ICA/Palmira were scattered and had yellow mosaic symptoms rather than the more typical green mosaic and vernal rugosity. This difference, which will be investigated by INTSOY and ICA scientists, may be due to different SMV strains, different plant/pathogen interaction due to environmental factors, or because the pathogen is not SMV but some other as yet unidentified virus.

I made several recommendations on ways to attempt control of this problem at the seed production level. Roguing and isolation of the crop from regular production fields by at least 200 m are two possibilities. Use of nonhost plant barriers may also contribute to reducing virus spread into seed fields. I recommended also an experiment to be sure that the mottling was always caused by virus infection. Also, plans are being laid to bring to Colombia segregating populations from the SMV-resistant material derived from INTSOY's Buffalo x Jupiter crosses for evaluation and selection in the Cauca Valley.

Occasional soybean plants were seen in the field with striking golden mosaic symptoms suggesting the occurrence of a whitefly-transmitted virus. Bemisia tabaci occurs in the Cauca Valley and may be the vector involved. The incidence of this disease is very low, but INTSOY will send a sample of PI 171,443 for testing; this accession is highly resistant to the whitefly-transmitted soybean yellow mosaic in India.

Institutions and Individuals Contacted

ICA/Palmira

Dr. Jorge Victoria, plant pathology
Ms. Francia V. de Agudela, plant pathology
Ing. Gilberto Bastidas, coordinator, soybean program

CIAT/Cali

Dr. Francisco Morales, bean virology
Dr. A. Bellotti, cassava entomology
Dr. Howard Schwartz, bean pathology
Mr. Ypali Jayasinghe, graduate student
Dr. Aart van Schoonhoven, bean entomology and coordinator,
bean program

ICA/Bogota

Dr. Gerardo Martinez-L., plant virology