

CURRICULUM VITAE

ELIZABETH ALVAREZ CABRERA

PERSONAL DATA

Birth: January 4, 1956 in Palmira, Valle
Nationality: Colombian
Civil State: Married

CAREER INTERESTS

- Major Research Interest: Host plant resistance, development of plant disease control strategies including biocontrol agents and biofungicides, pathogen population genetics and dynamics.
- Applying molecular principles to develop the finest diagnostic methods for seed quality and crop health.
- Organize training courses for students, technicians, laboratory scientists and farmers on an International, national or regional basis
- Supervise students thesis

EDUCATION

- Secondary education completed (high honors), 1973 Liceo Femenino, Palmira, Valle, Colombia
- Bachelor of Science, 1979
National University, Facultad de Ciencias Agropecuarias, Palmira, Colombia
Major agronomy title obtained: Agronomist Engineer
Thesis: Seed transmission of phytopathogenic bacteria of beans (*Phaseolus vulgaris* L.) in Colombia
Three different methods were compared to determine percentage of bean seed infection by *Xanthomonas phaseoli*. These methods consisted in determination of abnormal symptoms on seed coats, use of the most probable number technique (MNP) to determine percentage of infection seed, and induction of symptoms on bean seedlings obtained from seed samples.

- Specialized Courses, University of Minnesota, St. Paul, USA from January 1983 until March 1984. Plant Pathology Department
Mycology Ascomycetes-Fungi Imperfecti; Statistics; Viruses and Bacteria in Plant Diseases; Fungi, Algae and Parasitic Seed Plants in Plant Disease; Nematodes and Abiotic Agents in Plant Disease.
- M.Sc. Plant Pathology, 1992, Iowa State University
Thesis: Development of seed assays for detection of *Pseudomonas syringae* pv. *glycinea* in soybean seed
Two new assays were developed for detection of *Pseudomonas syringae* pv. *glycinea*, the causal agent of bacterial blight in soybean seeds. These methods were compared with existing assays. The new assays showed a much greater sensitivity for detection of the pathogen in seeds were also quicker and less labor intense than the other tests.
- Ph.D. Plant Pathology. 1995. Iowa State University
Thesis: Molecular variation in strains of *Fusarium* spp. affecting corn seed quality.
Five methods of classification were tested for differentiation of strains, including morphology, growth, mating populations, site directed (rDNA) polymerase chain reaction (PCR); and randomly amplified polymorphic DNA (RAPD). The PCR analyses were more reliable in differentiating the strains compared with the other traditional methods.

LANGUAGES

- Spanish
- English

AWARDS OF MERITS

- Fullbright Scholarship August 1989 - August 1991, Latin American Scholarship Program of American Universities
- Scholarship September 1991 - May 1995, Iowa State University
- Mrs. Glenn Murphy International award nomination, November 1992, Iowa State University
- Graduate student paper competition 1st place award at the annual meeting of the Association of Official Seed Analysts, June 1993, Fort Collins, Colorado
- CG Awards nomination, on the category of “Outstanding Local Staff”, September 1996, International Center for Tropical Agriculture- CIAT.
- Second place, XV Muestra Agroindustrial y Empresarial, Universidad La Gran Colombia, Armenia, Quindío, 1-3 November 2001. Control del mildew polvoso en cultivos de rosa por aplicación de un lixiviado de compost de plátano.
- Nomination for indigenous communities from Vaupés for the 2002 Equator Prize of UNDP for: Participatory research on the control of *Phytophthora* root rots in cassava, conservation of native cassava varieties, and agroecosystem sustainability.

- Award in Mutual Extension Efforts given by the Universidad Nacional de Colombia for “Desarrollo agrícola de la población indígena de la zona de influencia Mitú –Monfort (Vaupés, Colombia): Control de pudriciones en yuca mediante investigación participativa” as the best research work on technology transfer in Colombia.
- Award for Outstanding Partnership Program offered by the Consultative Group on International Agricultural Research (CGIAR) in Mexico 2004 for “Desarrollo de medidas de manejo del Moko (*Ralstonia solanacearum*) de plátano (*Musa AAB*) en Colombia, mediante investigación participativa con agricultores.”
- Premio Nacional de Fitopatología “Rafael Obregón” categoría profesional Mención honorífica , for the paper “Detección de marcadores microsatélites asociados con la resistencia al Añublo Bacterial de la yuca (*Manihot esculenta* Crantz) en Colombia”. PX Hurtado, E Alvarez, M Fregene and GA Llano. Presented at XXIV Congress of ASCOLFI. June 25 – 27, 2003.

EMPLOYMENT HISTORY

May 1995 - until now. Senior Staff, Plant Pathologist of the Cassava Program, International Center for Tropical Agriculture, CIAT. Cali, Colombia

September 1991 - May 1995. Research Assistant, Seed Science Center, Pathology Lab, Iowa State University, Ames, Iowa

July 1990 - January 1991. Laboratory Assistant in cell Biology Lab., Garst Seed Company ICI, Slater, Iowa

March 1985 - August 1989. Research Assistant in Plant Pathology Rice Program, CIAT International Center for Tropical Agriculture. Cali, Colombia

February 1983 - March 1984. Laboratory Assistant in Mycology Program. Plant Pathology Department, University of Minnesota, St. Paul, Minnesota

March 1982 - July 1982. Research Assistant in Pathology Bean Program, CIAT, Cali, Colombia

September 1980 - March 1982. Research Assistant in Cassava Pathology Program, CIAT, Cali, Colombia

June 1977. Technical Assistant Genetic Resources Program, CIAT, Cali, Colombia

June 1975. Technical Assistant Plant Taxonomy Laboratory, National University, Fac. Ciencias Agropecuarias, Palmira, Colombia

PROFESSIONAL ACTIVITIES

- Member of Asociación Colombiana de Fitopatología y Ciencias Afines "ASCOLFI"
- Member Organizing Committee of the 5th International Conference on Plant Pathogenic Bacteria. CIAT, 1981
- Member Organizing committee of the IV Congreso Asociación Colombiana de Fitopatología y Ciencias Afines "ASCOLFI". XII Reunión Anual Sociedad Americana de Fitopatología - División Caribe APS-CD. CIAT, July, 1982
- Member of The American Phytopathological Society (APS)
- Member of the Graduate Curriculum and Advising Committee, Plant Pathology Department, Iowa State University, 1992
- Member organizing committee XXIV "ASCOLFI" IV Congreso Asociación Colombiana de Fitopatología y Ciencias Afines "ASCOLFI". Armenia
- Member Organizing Committees CBN VI International Scientific Meeting of the Cassava Biotechnology Network, CIAT, 2003

ACQUIRED EXPERIENCE

My B.S. thesis research was conducted in the Instituto Colombiano Agropecuario (ICA), Palmira Station, under the direction of Dr. Jorge Victoria

The purpose of this work was based in seed transmission of bacterium phytopathogenic of bean (*Phaseolus vulgaris* L.) in Colombia, specifically *Xanthomonas phaseoli*. I determined simple and reliable methods to detect the presence, both internally and externally, of this bacteria in infected seeds, the percentage of seed infection and the induction of symptoms on bean seedlings.

Later on, I started to work at CIAT in the Cassava Pathology Program. I was working as a Research Assistant under the supervision of Dr. Robert Zeigler on superelongation disease of cassava. The research had three principal components: Disease physiology, pathogen identity and taxonomy.

In the taxonomic section of the work, the previously unknown sexual stage of the pathogen is described and proposed as a new species. This work clarified a confusing aspect of the identity of the causal agent and has direct application to agronomic practices and may influence breeding strategies.

The most important research involved field and growth chamber studies to determine the existence of pathogenic races to study the development of any new races. I assisted in the evaluation of varietal susceptibility to the pathogens found in cassava fields in CIAT-Palmira.

Through this research I have acquired a broad experience in manipulating difficult fungi, evaluating isolate-cultivar interactions, monospores isolates, collection of pathogens and approaching taxonomic problems.

I have actively participated in virtually all areas of research from the initial questions, failures and refinement of technique to data analyses.

I was working in the Pathology Bean Program under the supervision of Dr. Marcial A. Pastor Corrales, where I had acquired experience in the management of bean crop and the bacterial and fungal diseases. I prepared and conducted field inoculations and evaluations of bean lines for resistance to bacteriosis and rust in CIAT-Palmira and anthracnose and angular leaf spot in CIAT-Popayan. I also had some laboratory and greenhouse responsibilities related to identification and selection of resistant cultivars.

In 1982, I was working at the University of Minnesota St. Paul in Plant Pathology Department-Mycology Lab. Liofilization techniques for fungi were developed. Studies about *Cercospora beticola* done: Comparisons based on morphological difference and variations in host reaction, conidial measurements obtained from inoculation of sugar beet with the isolates. Electrophoresis techniques were used to establish the difference between isolates of *Cercospora*.

In 1984, I was working at CIAT - International Center of Tropical Agriculture in Plant Pathology Rice Program.

Rice cultivars were inoculated under controlled conditions with isolates of *Magnaporthe grisea* to study cross protection to blast disease.

- Identification of pathogenic bacteria were determined using biochemical tests and electron microscopy. Experiments were conducted to test the resistance of rice cultivars to *Pseudomonas fuscovaginae* bacterium identified in CIAT Pathology Laboratory
- Screening of rice cultivars for resistance to *Gerlachia oryzae* causal agent of leaf scald
- Isolates of *Bipolaris* spp. of diverse geographical origin were cultured and comparison made of colony, conidial morphology and aggressiveness
- Plasmid isolation technique was improved to establish the difference between species of *Pseudomonas* from rice seed
- Plasmid isolation was determined from *P. glumae*, *P. fuscovaginae*, *P. syringae*, and *P. avenae* bacterial isolates obtained from rice seed.

In 1990, I started working at Garst Seed Company. Molecular techniques were performed to accomplish transformation of soybean cells by bombardment with a particle gun using *Escherichia coli* bacterium as a vector carrying the gene of interest.

Large scale preparations of Plasmid DNA following lysis by Alkali procedure were conducted. Plasmid DNAs, isolated from bacterial culture were analyzed by digestion with restriction enzymes and gel electrophoresis. Soybean cells were also transformed by isolating protoplast and then putting the gene of interest into a protoplast by Electroporation.

In 1991, I started working at the Seed Science Center, Seed Pathology Laboratory under the supervision of Dr. Denis McGee.

Two new assays, grinding seed and direct plating, were developed for detection of *Pseudomonas syringae* pv. *glycinea* (Psg), the causal agent of bacterial blight in soybean seeds. These methods were compared to soaking and soaking-centrifugation assays on 21 soybean seed lots obtained from commercial seed companies and the Seed Science Center at Iowa State University. All four assays ranked the severity of infection similar for the 21 seed lots tested in the study. The sensitivity between tests differed with the grinding assays having a much greater sensitivity for detection of the pathogen in seeds than the other tests. The direct plating assay also had high level of sensitivity, but the test measured incidence of the seed infection, whereas the other tests measured colony-forming units. A group of bacterial isolates identified as Psg among the four assays consistently gave the correct response when subjected to the main diagnostic test used in the assays: pathogenicity, fluorescence, oxidase, levan, esculin, protease and antiserum. Similarly, *Pseudomonas fluorescence* and *Erwinia herbicola*, also found in seed, were clearly distinguished from Psg in these tests.

In 1993, I worked with *Fusarium moniliforme* (Fm) a seedborne fungal pathogen of corn, under the supervision of Dr. Thomas Harrington at Iowa State University. Effects of *F. moniliforme* seed quality were determined in the study and five methods of classification were tested for differentiation of strains, including mating populations, site directed (rDNA) polymerase chain reaction (PCR), and randomly amplified polymorphic DNA (RAPD). The PCR analyses were more reliable in differentiating the strains compared with the other traditional methods.

Actually, I am working as head of the Cassava Plant Pathology Program at the International Center for Tropical Agriculture (CIAT). Molecular techniques have been developed to characterize cassava bacterial and root rot pathogens. A study of genetic variation of *Xanthomonas axonopodis* pv. *manihotis* in Colombia, Brazil and Venezuela were performed. Assays for detection of *Xanthomonas axonopodis* pv. *manihotis* by Dot-Blot hybridization and polymerase chain reaction (PCR) were developed. Biological control agents of Cassava root rot pathogens were identified. A Study of genetic variation of *Phytophthora* species in Colombia was conducted. Genetic diversity and Sexual recombination of *Thielaviopsis paradoxa* was determined. Field experiments have been conducted at Carimagua (Llanos Orientales), Villavicencio (Meta), Santander de Quilichao (Cauca) and Mitú (Vaupes) to screen for Resistance to Cassava bacterial and fungal pathogens.

SPECIAL TRAINING

- ICI, Garst Seed Company Slater, Iowa 1990. Cell Biology Unit. Use of molecular techniques to accomplish transformation of soybean.
- Biotechnology workshop course. 1992. Iowa State University. Genetic engineering: transformation of cell with DNA.
- APS workshop, Portland, Oregon. 1992. Use of PCR and RAPD molecular techniques to detect seedborne pathogens.
- APS workshop, Montreal, Canada, June 1999. Introduction to molecular and genomic techniques.
- SYNGENTA, 2003 Woodland, California Real Time PCR training (Dr. Germán Hoyos)

TRAINING

1986. Visiting Scientist. University of Minnesota, Virology Laboratory. July-October Purification and identification of virus from potato disease plants. (Dr. Ernest Bantari). St Paul, Minnesota
1996. Visiting Scientist. Danish Government Institute of Seed Pathology (DGISP) Developing Countries, *Ralstonia solanacearum* (Dr. C. N. Mortensen) Copenhagen, Denmark
1997. Visiting Scientist. Cooperative Research Center for Tropical Plant Protection and Queensland University, Brisbane, Australia Identification of *Phytophthora* species by molecular techniques. (Dr. A. Drenth,)
1999. Visiting Scientist. Iowa State University. Mycology Laboratory. July. Cloning and sequencing a mating type gene (MAT-2) in *Ceratocystis paradoxa* (T. Harrington) Ames, Iowa
1999. Visiting Scientist. Kansas State University, Manhattan, Kansas, USA. Analyses of genomic DNA by Southern Hybridization: Separation of restriction fragments of genomic DNA by agarose gel electrophoresis, transfer of DNA to solid support, transfer of DNA to nylon membranes and hybridization of radiolabeled probes to immobilized nucleic acids (Dr. J. Leach)
2000. Visiting Scientist. Plant Protection Service, Identification of *Phytophthora capsici* and a second-generation interspecific hybrid by isoenzyme analysis. Identification of *Pythium* species. (Dr. W. Man in 't Veld) Wageningen, The Netherlands.
2000. Visiting Scientist. Scottish Crop Research Institute. Identification of *Phytophthora* species by restriction enzymes. Isolation and conservation techniques. (Dr. J. Duncan) United Kingdom
2001. Visiting Scientist. Iowa State University. Mycology Laboratory. Detection of Phytoplasma by nested PCR and identification by DNA sequencing (T. Harrington) Ames, Iowa
2003. Visiting Scientist. Iowa State University. Detection of Phytoplasma by electron microscopy techniques. (T. Harrington, Tracey Pepper) Ames, Iowa

BUILDING CAPACITY

Courses

- Instructor. The first International Course on Seed Health Testing Techniques for Rice held at the International Rice Research Institute (IRRI). Nov-Dec 1989. Philippines
- Coordinator and Instructor. Técnicas moleculares aplicadas a la identificación de la resistencia a enfermedades de diferentes cultivos. Course to researchers from different universities and institutes from Colombia. Financing: Agricultural Ministry of Colombia. December 9 – 18, 1999. CIAT- Palmira.
- Coordinator and Instructor. Biología molecular con énfasis en la caracterización de hongos fitopatógenos. Oct, 1997
- Coordinator and Instructor. Integrated management of Moko disease in plantain. Technicians and producers of plantain, 23 participants. June 9 – 13, 2003 CIAT –Palmira

Training

- Training to multipliers of technology transfer. Technicians from SENA Armenia, Comité de Cafeteros de Risaralda, Secretaría de Agricultura de Risaralda, UMATAs (Risaralda, Quindío and Norte del Valle). Farmers from Quindío, Risaralda and North of Valle del Cauca. April 3 – 6, 2000. Pereira, Risaralda
- Technicians from Fundación CEMILLA, Secretaría de Agricultura y Desarrollo Rural de Agua Azul, UMATAs Casanare. Training in cassava disease integrated management. May 30-June 2, 2000. Aguazul, Casanare.
- Dr. Hanne Nielsen of the collaborative project with the Danish Government Institute of Seed Pathology (DGISP), Copenhagen, Denmark. Training in Molecular characterization of bacterial and fungal pathogens. September 2000. CIAT- Palmira.
- María del Socorro Balcázar, Project SB-2, CIAT. Training in molecular characterization of *Xanthomonas campestris*. October 2000. CIAT- Palmira
- Four oil palm technicians trained in bud rot control strategy in Villanueva (Casanare) and Paratebueno (Cundinamarca) January, March, and April 2001.
- Ten professors and students of the Universidad Nacional de Colombia (Palmira) trained in molecular techniques 4-6 April 2001.
- 31 farmers and technicians trained in integrated disease management in cassava, held in El Tambo Cauca, Colombia June 9, 2001.
- Case study on participatory research to control cassava root rots, at the course “*Methods and techniques of farmer participation in research*”, The 24 participants included CIAT research assistants, professionals from the Ministries of Agriculture of Cuba and Costa Rica, professionals from INIA (Chile). June 29, 2001. CIAT-Palmira
- 18 students and technicians from Sena-Buga (Valle del Cauca, Colombia) trained in integrated disease management in cassava, 17 August 2001. CIAT-Palmira
- Three courses for 137 participants in Cassava production: integrated disease management, Venezuelan municipalities of El Tigre (Anzoátegui), San Carlos (Cojedes), and Maracaibo (Zulia), 4-15 May 2002.
- 242 indigenous women farmers of the communities of Cucura, Bocas del Yí, and Macaquiño, Colombia. October-December, 2002

- Establishing Local Agricultural Research Committees 15 indigenous farmers and local technicians. April, 2002
- Integrated management of cassava pests and diseases For Master Science students from Escuela Politécnica del Ejército, ESPE, September 10-12, 2002. Ecuador
- Four workshops with indigenous women from communities Macaquiño, Urania, Cachivera and Cucura communities, in order to create local agricultural research comitees. 87 participants. October – November, 2002.
- Fátima Rodríguez INTA Nicaragua. Manejo integrado de enfermedades de yuca. Nov 18 de 2004
- Isabel Bortagaray. Funcionario de United nations University/Institute for New Technologies (UNU/INTECH). Maasticht. Innovación en el sector de yuca en Colombia. Manejo de enfermedades. Nov 29 de 2004
- Robert Kalyebara. Banana Research Program. Uganda. Estrategias de manejo del Moko de plátano y banano. Dic 8 de 2004.
- Ing. José M. Lugo Pérez. Caribbean Best, Costa Rica. Manejo integrado de enfermedades de yuca. Febrero 8 al 10 del 2005
- Juan José Font y Jorge Fuentes. Representaciones Comerciales S.A. Guatemala. Manejo de enfermedades de yuca. Agosto 18 de 2005
- Pasantía de Mathilde Ouevrard. Aplicación de biofungicidas en el control de enfermedades de uva. Evaluación de concentración mínima inhibitoria de varios productos sobre *R. solanacearum*. Mayo 23 – Julio 21 de 2005
- Sandra Milena Rodríguez corpoica- Villavicencio Detección por PCR de *Ralstonia solanacearum* obtenida de muestras de suelo colectadas en un lote comercial de plátano en la región del Ariari. Abril 30- Mayo 13 de 2005
- Ana Maria Blanco de Rodriguez y Isola Esperanza Rebelto Ramos, MAFOR , Nicaragua. Deteccion , identificación e inoculacion de hongos y bacterias fitopatogenos. 26 Septiembre –7 Octubre de 2005
- Dr. Helen Griffiths, Plant Pathology and Plant Breeding and Genetics Dept Cornell University, Ithaca, Phytoplasma, Octubre de 2005
- Francia Fuenmayor, CENIAP Deteccion , identificación e inoculacion de hongos y bacterias fitopatogenos. 26 Septiembre –7 Octubre de 2005

THESIS SUPERVISION

B. Sc.

1. Juan F. Mejía. 2001. Caracterización patogénica y molecular de *Sphaceloma manihoticola*, agente causal de superalargamiento en cultivares de yuca de Brasil. Universidad Nacional de Colombia, Sede Palmira, Colombia.
2. José Alfredo Ramírez. 1999. Termoterapia en semilla asexual de yuca. *Manihotis esculenta* Cranz para controlar pudrición radical inducida por *Phytophthora* spp. Universidad Nacional de Colombia, Palmira

3. Martha Molina. 1998. Caracterización morfológica y molecular de aislamientos del hongo *Sphaceloma manihoticola* Bitancour y Jenkins, Agente causal del superalargamiento en yuca *Manihoticola esculenta* Crantz. Universidad Católica de Manizales.
4. Silvio Fernando Cadena. 1998. Estudio de la virulencia de doce cepas de *Xanthomonas axonopodis* pv. *manihotis* en diferentes genotipos de yuca (*Manihotis esculenta* Crantz). Universidad Nacional de Colombia, Palmira
5. Jackeline Sánchez. 1993. Caracterización de *Phytophthora* spp. Agente causal de pudrición en raíz de yuca (*Manihotis esculenta* Crantz) utilizando pruebas de patogenicidad y técnicas moleculares. Universidad Nacional de Colombia, Palmira
6. Jaime Andrés Restrepo,. Evaluación de algunas variedades de yuca *Manihot esculenta* Crantz, a las condiciones ambientales de Mitú - Monfort, mediante investigación participativa. Tesis de Grado Ingeniero Agrónomo. Universidad Nacional de Colombia. Palmira. 2000. 95 pp.
7. Alejandro Torres. Aplicación de residuos de bosque selvático y sus efectos sobre algunas propiedades químicas de un suelo de la Amazonía colombiana y la sanidad de yuca a nivel de casa de malla. Tesis de Grado Ingeniero Agrónomo. Universidad Nacional de Colombia. Palmira. 2000. 120 pp.
8. Claudia Ximena Grajales and Jimena Villegas. 2002. Control de *Sphaerotheca pannosa* var. *rosae* en rosas mediante la utilización de lixiviado de compost de raquis de plátano. Universidad de San Buenaventura—Cali.
9. Jorge Alejandro Corredor. 2005 Evaluación de la asociación de características morfológicas y bioquímicas de la raíz de yuca (*Manihot esculenta* Crantz) con la resistencia a pudrición por *Phytophthora tropicalis* y al deterioro fisiológico poscosecha. Tesis de grado Universidad de Caldas, Manizales

M. Sc

1. Germán A. Llano. 2003. Identificación de genes análogos de resistencia a enfermedades en yuca, *Manihot esculenta* Crantz y su relación con la resistencia a tres especies de *Phytophthora*. M.Sc. thesis. Palmira, Colombia: Universidad Nacional de Colombia. 119 pp.
2. Paula X. Hurtado. 2003 Evaluación de marcadores microsatélites y genes análogos, asociados a la resistencia de yuca a *Xanthomonas axonopodis* pv. *manihotis*. For a Master of Biology with emphasis in Plant Molecular Biology. Universidad de los Andes—Bogotá
3. John B. Loke. 2004 Análisis genético de la resistencia de yuca (*Manihot esculenta* Crantz) a *Phytophthora tropicalis*, causante de pudrición radical. Universidad Nacional de Colombia—Palmira. For a Master of Plant Breeding.
4. Juan Fernando Mejía .2005 Identificación de genes análogos de resistencia asociados con superalargamiento en la familia ACR de yuca Universidad Nacional de Colombia sede Palmira

Ph. D

Larsting University, Cuba Maryluz Folgueras

PROJECT DEVELOPMENT

1996

Caracterización molecular de aislamientos de *Fusarium* spp., *Thielaviopsis* spp. y *Phytophthora* spp. Agentes causales del complejo pudrición de cogollo en la palma de aceite. (CENIPALMA) US\$25.658 **Approved**

1997

Determinar la efectividad (hongos, nematodos) de la aplicación de microorganismos benéficos en el control de agentes causales de la pudrición de cogollo en plantaciones de palma de aceite en Colombia (CENIPALMA) US\$14.787. **Approved**

Caracterización molecular de aislamientos de *Thielaviopsis* spp. de Colombia y Ecuador, Agentes causales del complejo pudrición de Cogollo en la palma de aceite. (CENIPALMA) US\$24.445 **Approved**

1998

Desarrollo Agrícola de la población indígena de la zona de influencias de Mitú-Monfort (Vaúpes, Colombia): Control de pudrición en yuca mediante investigación participativa (PRONATTA) US\$ 152.312. **Approved**

1999

“Identificación de marcadores moleculares asociados a la resistencia al complejo de pudrición de cogollo en la palma de aceite (*Elaeis guineensis* Jacq.) (FONTAGRO). US\$1.000.000. **Approved**
Development of Integrated Control of Cassava Root and Stems Rots in Colombia by Manipulation of the Soil Microbiological Environment. (COLCIENCIAS). US\$ 48.787. **Approved**

Caracterización genética e inducción de resistencia a *Sphaerotheca pannosa*, agente causal de Mildeo Polvoso de rosa en Colombia . Primera Fase. (ASOCOLFLORES) US\$ 40.295. **Approved**

Transferencia de Tecnología para el Manejo Integrado de Enfermedades de Yuca en Colombia. (Ministerio de Agricultura). Fase I. US\$35.481. **Approved**

Determinación del Agente Causal del Marchitamiento Letal en Cultivos de Palma de Aceite. (*Elaeis guineensis* L.) (Palmar del Oriente – Palmas de Casanare). US\$ 8.279. **Approved**

Producción sostenible de yuca y cultivos asociados en un sistema agroforestal indígena con participación comunitaria. (PRONATTA). US\$201.833. **Approved**

Desarrollo y validación de alternativas de manejo de la antracnosis de los cítricos y otros frutales en Colombia. CORPOICA - CIAT – 2001. US\$ 9.166. **Approved**

2001

Caracterización Genética e Inducción de Resistencia a *Sphaerotheca pannosa*, el Agente Causal de Mildew Polvoso en Rosa de Colombia. Segunda fase. (ASOCOLFLORES).US\$46.340.

Approved

2002

Avance en el desarrollo de tecnologías de cultivo y postcosecha para una producción rentable y sostenible de guanábana (*Annona muricata* LINN) FONDO DE COOPERACION ESPAÑOLA US\$ 56.166. **Approved**

Desarrollo y Validación de Alternativas Limpias de Manejo Integrado del Moko (*Ralstonia solanacearum*) de plátano (*Musa* sp) en Colombia. MADR. US\$ 40.800 **Approved**

2003

Identification of a phytoplasma associated to Lethal Wilt in oil palm. (Palmar del Oriente, Palmas de Casanare and Palmeras Santana). US\$29.500. **Approved**

Caracterización molecular de un fitoplasma que está afectando el cultivo del lulo en Colombia. ICA. US\$4.000 **Approved**

Detección y manejo de microorganismos asociados con Cuero de Sapo en yuca.MADR. Project cost: US\$57.931. **Approved**

2004

Identification of insect vectors and alternative hosts of phytoplasma causing cassava Frogskin Disease. Presented to USAID. Funds requested: US\$ 12.000. **Approved.**

Desarrollo de estrategias de manejo de Cuero de Sapo y Superlargamiento en yuca, mediante investigación participativa. Presented to Ministerio de Agricultura y Desarrollo de Colombia. Funds requested: US\$ 14.546 for 1 year. **Approved.**

Combating Hidden Hunger in Latin America: Biofortified crops with improved Vitamina A, Essential Minerals and Quality Protein (English). Presented to Presented to CIDA. Funds requested: US\$ 122.880 for 6 years. **Approved.**

Manejo Integrado de Enfermedades del Cultivo de Yuca. Presented to Ministerio de Agricultura y Desarrollo de Colombia and IICA. Funds requested: US\$ 77.700. **Approved.**

Pest and disease resistance, drought tolerance and increased shelf life genes from wild relatives of cassava and the development of low-cost technologies to pyramid them into elite progenitors. Presented to The generation challenge programme. Funds requested: US\$ 289.200 per year, for 3 years. **Approved**

2005

Lulo con valor agregado: Nuevas alternativas para el pequeño productor. Convocatoria de CIAT-Colciencias Valor total proyecto: \$721.590.000. Solicitado en cofinanciación: \$552.940.000

Colección, caracterización y multiplicación clonal de selecciones criollas de aguacate con énfasis en la identificación de patrones con tolerancia a *Phytophthora spp.* MADR CONCIENCIAS. Costo total: \$1.015.012. Cofinanciación solicitada: \$439.450

Propuesta de desarrollo comunitario rural: Desarrollo y Transferencia de Medidas de manejo del Moko (*Ralstonia Solanacearum*), En Cultivos de Plátano del Municipio de Armenia. presentada a La Alcaldía de Armenia. Solicitado USD\$6.000.

Manejo integrado de la enfermedad del Moko en plátano, FEDEPLATANO, USD10.000

Tecnologías innovativas para reducir agroquímicos en plátano y banano. Se solicitó al Fondo un presupuesto a financiar total de US\$ 300,000.00. La Contrapartida es US\$ 353,890.00. FONTAGRO

Alianzas estratégicas para producción sostenible de yuca en los Andes. Presupuesto total solicitado al Fondo: US\$ 300,000. Presupuesto de contrapartida:US\$ 640.000. FONTAGRO

Mejoramiento del manejo nutricional para el control preventivo del mildew veloso del rosal, *Peronospora sparsa*. Presentado a COLCIENCIAS-MADR Fondos solicitados \$96.440.000 total \$236.040.000

Buenas prácticas Agrícolas: Manejo de la acntriosis en el cultivo de tomate de árbol Presentado a CIAT-SENA Fondos solicitados \$200.000.000

CONGRESS ASSISTANCE

1978. III Congreso de la Asociación Colombiana de Fitopatología y Ciencias Afines (ASCOLFI). October 25-27. Manizales, Colombia,
1980. IV Congreso de la Asociación Colombiana de Fitopatología y Ciencias Afines (ASCOLFI). July 2-5. Medellin, Colombia. Thesis work presented in this congress and selected among the best eight works to the award "Gonzalo Ochoa"
1980. III Congreso de la Sociedad Colombiana de Entomología (SOCOLEN). Cali, Colombia
1981. V International Conference in Plant Pathogenic Bacteria. CIAT, Cali, Colombia
1988. Congreso de la Asociación Colombiana de Fitopatología y Ciencias Afines "ASCOLFI". July. Pasto, Colombia
1988. XXVIII Reunión Anual sociedad Americana de Fitopatología, División del Caribe APS. September, San Andres, Colombia
1990. Regional Seed Quality Meeting. March, Urbana at Champaign

1990. American Phytopathological Society (APS) and Canadian Phytopathological Society (CPS) joint meeting, Grand Rapids, Michigan
1991. 13th Annual Seed Technology Conference, February 26, Ames, Iowa
1991. Regional Seed Quality Meeting, March, Urbana at Champaign
1991. 68th Annual Meeting Society of Commercial Seed Technologists. 81st Annual Meeting Association of Official Seed Analysts, June 6-14, Lexington, Kentucky
1991. American Phytopathological Society (APS) meeting. August 17-21, St. Louis, Missouri
1992. Fourteenth Annual Seed Technology Conference, February 25-26, Ames, Iowa
1992. The American Phytopathological Society (APS) and the Mycological Society of American (MSA) Joint Meeting, August 8-12, Portland, Oregon
1992. American Seed Trade Association '92 Soybean Seed Research and Corn and Sorghum Industry Research Conferences, December 8-11, Chicago, Illinois
1993. Fifteenth Annual Seed Technology Conference, February, 23-24, Ames, Iowa
1993. Regional Seed Quality Meeting, March, Urbana, at Champaign, Illinois
1993. 83rd Annual Meeting Association of Official Seed Analysts, and 70th Annual meeting Society of commercial seed technologists. June 11-18, 1993, Fort Collins, Colorado
1998. The American Phytopathological Society APS annual meeting. July 26-31, Indianapolis.
1998. IV International Scientific Meeting of the Cassava Biotechnology Network (CBN), Brazil
1999. The American Phytopathological Society APS annual meeting. August 7-14, Rochester, New York.
1999. Congress of the American Phytopathological Society (APS), Montreal, Canada, August.
1999. XX Congreso Nacional de Fitopatología y Ciencias Afines (ASCOLFI), July 2. Manizales, Colombia,
2000. The American Phytopathological Society (APS). August 13. New Orleans.
2000. 7th International Congress of Plant Pathology (ICPP2003), August 9-16. Edinburgh, Scotland .
2001. XXI Congreso Nacional de Fitopatología y Ciencias Afines. September 1. Palmira, Centro Internacional de Agricultura Tropical (CIAT).
2001. The American Phytopathological Society (APS), SON and MSA Joint Meeting August 25-29.
2002. XXIII Congreso Nacional de Fitopatología, (ASCOLFI), 3-6 July. Bogotá, Colombia
2002. III International Congress of the National College of Bacteriologists (CNB). 1-4 November Cali, Colombia
2003. 8th International Congress of Plant Pathology (ICPP2003), 2 - 7 February 2003. Christchurch, New Zealand
2003. XXIV Congreso Nacional de Fitopatología, (ASCOLFI), June 25-27. Armenia, Colombia.
2003. The American Phytopathological Society APS annual meeting. August 9 - 13. Charlotte, NC, USA.
2004. Sixth International Scientific Meeting of the Cassava Biotechnology Network, 9 (CNB). 8-14 March. Cali, Colombia
2004. Annual Meeting of the American Phytopathological Society (APS), 31 July to 4 August. Anaheim, CA
2004. XXV National Congress of Phytopathology, ASCOLFI 13-15 August. Cali, Colombia

2005. 5th ISTA- SHC Seed Health Symposium. Association International Seed Testing , 10-13 Mayo Angers, France
2005. II seminario internacional sobre producción, comercialización e industrialización de plátano. 28 august -2 september, Manizales, Caldas, Colombia
- 2005 XXVI National Congress of Phytopathology, ASCOLFI 5-8 October. Bogotá, Colombia

PUBLICATIONS

ELIZABETH ALVAREZ

REFEREED JOURNAL

1. Zeigler, R.S., Alvarez, E., and Lozano J.C. 1983. Evidence for pathogenic specialization of *Sphaceloma manihoticola* on cassava. (Abstract). *Phytopathology* 73:126.
2. Zeigler, R.S., Alvarez, E., and Lozano J.C. 1983. Some characteristics of cassava resistance to the Superelongation disease caused by *Elsinoe brasiliensis*. *Tropical Pest Management* 29:148-158.
3. Zeigler, R.S., Alvarez, E. 1986. Bacterial Sheath brown rot of rice, caused by *Pseudomonas fuscovaginae*, in Latin America. *Plant Disease*. 71:592-597.
4. Zeigler, R.S., Alvarez, E. 1986. Bacterial sheath brown rot (BSBR) in Latin America. *International Rice Research Newsletter*. 11(5):19-20.
5. Zeigler, R.S., Rubiano, M., and Alvarez, E. 1987. Heat and chemical therapy to eradicate *Pseudomonas fuscovaginae* form rice seed. *International Rice Research Newsletter*. Vol. 12 No. 5, p. 18-19.
6. Zeigler, R.S., and Alvarez, E. 1987. Differential culture medium for *Pseudomonas* species causing sheath rot (ShR) and grain discoloration (Gid) of rice. *International Rice Research Newsletter*. 14:27-28.
7. Zeigler, R.S., and Alvarez, E. 1987. Pudrición bacterial de la vaina del arroz causada por *Pseudomonas fuscovaginae* en America Latina. *Fitopatologia Brasileira*. Vol.XII, No.3, p.193-198.
8. Zeigler, R.S., and Alvarez, E. 1989. *Pseudomonas* species causing sheath rot (shR) and grain discoloration (GID) of rice. *International Rice Research Newsletter* 14:26.
9. Zeigler, R.S., and Alvarez, E. 1989. Grain discoloration of rice in Latin America caused by *Pseudomonas glumae*. *Plant disease* 73:368.
10. Alvarez, E., and Zeigler, R.S. 1989. Pudrición bacterial de la vaina del arroz causada por *Pseudomonas fuscavaginae* en America Latina. *Fitopatología Colombiana*, Vol. 13, No. 1 p. 5-8.
11. Zeigler, R.S., and Alvarez, E. 1990. Characteristics of *Pseudomonas* spp. causing grain discoloration and sheath rot of rice, and associated Pseudomonad Epiphytes. *Plant Disease*. 74:917-922.
12. Alvarez, E., and McGee, D. 1995. New assays for detection of *Pseudomonas syringae* pv. *glycinea* in soybean seed. *Plant Disease* 79:12-14.

13. Alvarez, E. 1996. Study of the penetration of corn leaves line B73 and A619 by the new race of (*Helminthosporium carbonum*) (*Bipolaris zeicola*). Plant Pathologist, International Center for Tropical Agriculture (CIAT). Fitopatología Colombiana, Vol. 20, No. 1-2 p. 44-47.
14. Verdier, V., Restrepo, S., Boher, B., Nicole, M., Geiger, J.P., Alvarez, E. and Bonierbale, M. 1997. Cassava bacterial blight: recent achievements in understanding the disease. African Journal and Tuber Crops Vol. (1 and 2) Pag: 64-67
15. Alvarez, E., Cadena, S.F., and Llano, G.A. 1999. Evaluación de resistencia de yuca a doce cepas de *Xanthomonas axonopodis* pv. *manihotis*. ASCOLFI INFORMA Vol. 25 No.(4- 6).
16. Alvarez, E., and Molina, M.L. 2000. Characterizing the *Sphaceloma* fungus, causal agent of superelongation disease in cassava. Plant Disease. April. 84: 423-428.
17. Bedoya, F.A., Alvarez. E., Loke, J.B. 2000. Selección *in vitro* de aislamientos de *Trichoderma* spp. para el control biológico de la pudrición radical en yuca. Fitopatología Colombiana. Vol. 23. No. 2. p. 65-67.
18. Ramírez, J.A., Alvarez, E., Marmolejo, De la T. F. 2000. Determinación *in vitro* de la sensibilidad térmica de cepas de *Xanthomonas axonopodis* pv *manihotis*, agente causal de la bacteriosis vascular de la yuca. Fitopatología Colombiana. Vol. 23. No. 2. P. 87-91.
19. Alvarez, E., Claroz, J.L., Loke, J.B., and Echeverri, C. 2000. Diversidad genética y patogénica de *Sphaerotheca pannosa* var. *rosae* hongo causante del mildew polvoso en la rosa en Colombia. Revista ASOCOLFLORES. No. 58. Enero - Junio. p. 36-44.
20. Alvarez, E., Claroz, J.L., Loke, J.B., and Echeverri, C. 2000. Potencial de un extracto vegetal y fertilizantes foliares para el control de mildew polvoso de rosa, causado por *Sphaerotheca pannosa* var. *rosae* en Colombia. Revista ASOCOLFLORES. No. 58. Enero - Junio. p. 45-50.
21. Alvarez, E., Claroz, J.L., Loke, J.B., and Echeverri, C. 2000. Pathogenicity and genetic diversity of *Sphaerotheca pannosa* var. *rosae*, causal agent of powdery mildew of roses in Colombia. Phytopathology: Vol. 90, No. 6, S 3.
22. Alvarez, E., and Mejia, J.F. 2000. Pathogenic and molecular characterization of Brazilian isolates of *Sphaceloma manihoticola* of cassava. Phytopathology: Vol. 90, No. 6, S 2.
23. Alvarez, E., Claroz, J. L., Loke, J.B., Echeverri, C. 2001. Caracterización genética y patogénica en Colombia de *Sphaerotheca pannosa* var. *rosae*, agente causal del mildew polvoso en rosa. Fitopatología Colombiana 25(1-2):7-14,
24. Alvarez, E., Grajales, C.X., Villegas, J., Loke, J.B. 2002. Control del mildew polvoso (*Sphaerotheca pannosa* var. *rosae*) en rosa (*Rosa* sp.), usando un lixiviado de compost del raquis de plátano (*Musa* AAB). Revista ASOCOLFLORES # 62: 41 – 47
25. Alvarez, E., Echeverri, C., Loke, J.B. 2002 . Validación de un biofungicida y fertilizantes foliares como alternativa de control del mildew polvoso en cultivos de rosa. Revista ASOCOLFLORES # 62 : 31-40.
26. Llano, G.A., Alvarez, E., Loke, J.B., Madriñán, R., Restrepo, J.A., Mora, J.R. 2002. Evaluación de la adaptación de variedades de yuca con resistencia a *Phytophthora* spp., mediante investigación participativa en comunidades indígenas de Mitú (Vaupés, Colombia). Revista Acta Agronómica Vol 51 (1/2): 31-39.
27. Alvarez, E., Mejia, J.F., and Valle, T.L. 2003. Molecular and pathogenicity characterization of *Sphaceloma manihoticola* isolates from south- central Brazil. Plant Dis. 87: 1322-1328
28. Alvarez, E., Loke, J.B., Rivera, S. y Llano, G.A. 2003. Genética de la resistencia a pudrición causada por *Phytophthora tropicalis* en dos poblaciones segregantes de yuca (*Manihot esculenta* Crantz). Revista Fitopatología Colombiana Vol 26 (2): 61 - 66. Cali, Colombia.

29. Alvarez, E., Mejía, J.F., Loke, J.B., Hernández, L., and Llano, G.A. 2003. Detecting the phytoplasma frogskin disease association in cassava (*Manihot esculenta* Crantz) in Colombia. *Phytopathology* 93 (6): S4.
30. Alvarez, E., Hurtado, P.X., Fregene, M., and Llano, G.A. 2003. Detecting SSR markers associated with resistance to cassava bacterial blight (CBB) in Colombia. *Phytopathology* 93 (6): S4
31. Alvarez E; Mejía JF; Huertas C; Varón F. 2004. Detección y caracterización molecular de un fitoplasma, asociado con el “machorreo” del lulo (*Solanum quitoense*) en Colombia. *Fitopatol Colomb* 27(2):71-76.
32. Hurtado PX; Alvarez E. 2004. Búsqueda de genes análogos de resistencia asociados con la resistencia al añublo bacterial de la yuca. *Fitopatol Colomb* 27(2):59-64.
33. Llano GA; Alvarez E; Muñoz JE; Fregene M. 2004. Identificación de genes análogos de resistencia a enfermedades en yuca (*Manihot esculenta* Crantz), y su relación con la resistencia a tres especies de *Phytophthora*. *Acta Agron* 53(1/2).
34. Calle F; Pérez JC; Gaitán W; Morante N; Ceballos H; Llano GA; Alvarez E. 2004. Genetics of relevant traits in cassava (*Manihot esculenta* Crantz) adapted to acid-soil savannas. *Euphytica*
35. Hurtado PX; Alvarez E; Fregene M; Llano GA. 2004 Detección de marcadores microsatélites asociados con la resistencia a *Xanthomonas axonopodis* pv. *manihotis* en una familia de yuca (bc1). *Fitopatol Colomb*
36. Gómez, E.A., Alvarez, E. y Llano, G. 2005. Identificación y caracterización de cepas de *Ralstonia solanacearum* raza 2, agente causante del Moko de plátano en Colombia. *Revista Fitopatología Colombiana*
37. Alvarez, E., Ospina, C.A., Mejía, J.F., Llano, G.A. 2005. Caracterización genética morfológica y patogénica de *Colletotrichum gloeosporioides*, agente causante de la antracnosis en Guanábana (*Annona muricata*) en las zonas productoras del Valle del Cauca. *Revista Fitopatología Colombiana*
38. Segenet Kelemu, Lee Calvert, Cesar Cardona, Fernando Correa, Robin Buruchara, George Mahuku, Elizabeth Alvarez, and Eliaineny Minja. 9th ICABR International Conference on Agricultural Biotechnology: Ten Years Later. Ravello (Italy), July 6 to July 10, 2005. *Advances in Application of Agricultural Biotechnology to Control Diseases and Pests of Tropical Crops.*
39. Arenas, A., López, D., Álvarez, E., Llano, G., Loke, J.B. 2005. Efecto de Prácticas Ecológicas Sobre la Población de *Ralstonia Solanacearum* Smith, Causante de Moko de Plátano. *Revista Fitopatología Colombiana*

BROCHURES

- Alvarez, E. 1998. Pudrición Radical y marchitez de la yuca.
- Alvarez, E. y Llano, G.A. 2003. Añublo bacterial de la yuca: Management strategies
- Alvarez, E. y Mejía, J.F. 2003. Superalargamiento de la yuca: Management strategies

BOOK CHAPTERS:

- Alvarez, E., Llano, G.A. 2002. Enfermedades del cultivo de la yuca y métodos de control. Chapter in: *Cultivo de la yuca en el tercer milenio. Sistemas modernos de producción,*

procesamiento utilización y comercialización. Edited by B. Ospina and H. Ceballos. p. 131 – 147. CIAT, Cali, 2002.

- Alvarez, E., Llano, G.A. 2002. Guía práctica para el manejo de las enfermedades, las plagas y las deficiencias nutricionales de la yuca. Chapter in pocketbook. p. 19 – 40. CIAT, Cali, 2002. .
- Alvarez, E. Madriñan, R. and Llano, G. 2001. Handbook on “Investigación participativa para el control de pudriciones de yuca con comunidades indígenas de Mitú”. 16pp. Print run: 500.

OTHER PUBLICATIONS.

1. Alvarez, E. 1979. Transmisión por semilla de bacterias fitopatógenas de frijol *Phaseolus vulgaris* en Colombia. B.S. Thesis.
2. Zeigler, R.S., Lozano, L.C., and Alvarez, E. 1983. A summary of recent research on the superelongation disease of cassava. In Proceedings, Sixth Symposium of the International Society for Tropical Root Crops/hosted by CIP in Lima, Peru, 21-26 February, 1983. P.363-370. DNAL CALL No.:SB210.T615
3. Zeigler, R.S., and Alvarez, E. 1986. La pudrición café de la vaina de arroz. Paper presented in proceedings of PCCMCA, March 13-15, 1986. San Salvador, El Salvador.
4. Zeigler, R.S., and Alvarez, E. 1988. *Pseudomonas* spp. causing grain and sheath rot of rice in latin America. Poster presented at the Fifth International Congress of Plant Pathology, Kyoto, Japan (Abstract) (Invited paper).
5. Zeigler, R.S., and Alvarez, E. 1988. Characteristics which distinguish *Pseudomonas* species causing sheath rot and grain discoloration of rice. XXVIII Reunion Anual Sociedad Americana de Fitopatología. Division Caribe. APS-CD (Abstract).
6. Alvarez, E. 1991. Development of seed assays for detection of *Pseudomonas syringae* pv. *glycinea* in soybean seed. 68th Annual Meeting Society of Commercial Seed Technologies. 81st Annual Meeting Association of Official Seed Analysts. Lexington, Kentucky (Abstract).
7. Alvarez, E. 1991. Development of seed assays for detection of *P.s.* pv. *glycinea* on soybean seed. St. Louis, Missouri. The American Phytopathological Society APS Annual Meeting Poster No. 457.13.
8. Alvarez, E. 1991. Development of an improved seed assay for *Pseudomonas syringae* pv. *glycinea* in soybean seed lots. Iowa Seed Science. Vol. 13, No. 1.
9. Alvarez, E. 1992. Development of seed assays for detection of *Pseudomonas syringae* pv. *glycinea* in soybean seed. Iowa State University (M.S. Thesis).
10. Alvarez, E., and McGee, D. 1993. Characterization by vegetative compatibility grouping and random amplified polymorphic DNA of *Fusarium moniliforme* strains affecting corn seed quality. Poster presented at the Fifteenth Annual Seed Technology Conference, Ames, Iowa. Poster
11. Alvarez, E., Valencia, M., Loke, J.B., and Rosero, E. 1995. A new approach to characterize cassava root rot pathogens. CIAT Internal Review (Plant Breeding for Sustainable Agriculture).
12. Restrepo, S., Verdier, V., and Alvarez, E. 1995. Geographic variation of *Xanthomonas campestris* pv. *manihotis* in Colombia. CIAT Internal Review (Plant Breeding for Sustainable Agriculture).

13. Alvarez, E. 1995. El empleo de los marcadores moleculares para el diagnóstico de fitopatógenos . Memorias Curso Internacional de Protección Vegetal. Universidad Nacional Palmira, Colombia.
14. Alvarez, E., 1995. Variación molecular en aislamientos de especies de *Fusarium* afectando la calidad de la semilla del maíz. Invited paper. Memorias curso de capacitación en Patología de semillas. ICA - Palmira - Agosto 14-19.
15. Verdier, V., Restrepo, S., and Alvarez, E. 1995. Screening for resistance to bacterial blight in Cassava core collection. Internal CIAT Review.(Plant Breeding for sustainable Agriculture).
16. Restrepo, S., Verdier, V., and Alvarez, E. 1996 Geographic variation of *Xanthomonas campestris* pv. *manihotis* in Colombia. Deuxièmes Rencontres de Phytobactériologie. Aussois, France.
17. Restrepo, S., Verdier, V., Mosquera, G., Gerstl A., Laberry, R., Valle, T. and Alvarez, E. 1996. Cassava Bacterial Blight in South America: pathogenic and genetic characterization of the causal agent and its application to screening methods. In: Proc. 3th International Cassava Biotechnology Network, Kampala, 23-28 August, this volume
18. Verdier, V., Assigbété, K., Mosquera, G., Restrepo, S., Alvarez, E. and Geiger, J.P. 1996. Detection of *Xanthomonas campestris* pv. *manihotis* by dot-blot hybridization and polymerase chain reaction assays. In Proc. 9th Internatioanl Conference on Plant Pathogenic Bacteria, Madras, India, August 26-29.
19. Alvarez, E., Loke, J.B., and Mayer, R. 1996. Progress towards biological control of Cassava Stem and Root Rots. Poster presented at the Workshop Sobre Podridões Radiculares no Cultivo da Mandioca. Cruz das Almas, Bahía Brasil, 1996
20. Restrepo, S., Verdier, V., and Alvarez, E. 1996. Cassava Bacterial Blight in South America: Pathogenic and Genetic Characterization of the causal agent and its application to screening methods. Poster presentation in: CBN III, Kampala, Uganda.
21. Verdier, V.¹⁻², Assigbété, K.¹, Mosquera, G.², Restrepo, S.², Alvarez, E.² and J.P.¹. Geiger. 1996. Detection of *Xanthomonas Campestris* pv. *manihotis* by Dot-Blot Hybridization and polymerase chain reaction (PCR) assays. Poster presentation in: 9th International Conference on Plant Pathogenic Bacteria.
22. Restrepo, S., Verdier, V., and Alvarez, E. 1996. DNA Polymorphism and virulence variation of *Xanthomonas campestris* p.v. *manihotis* in Colombia. Oral presentation in: 9th International Conference on Plant Pathogenic Bacteria.
23. Verdier, V., Restrepo, S., Boher, B., Nicole, M., Geiger, J.P., Alvarez, E. and M. Bonierbale. 1996. Cassava bacterial blight: Recent achievements in understanding the disease. Oral presentation in: CBN III, Kampala, Uganda.
24. Restrepo, S., Verdier, V., and Alvarez, E. 1996. Polymorphisme de l'ADN et variabilité du pouvoir pathogène de *Xanthomonas campestris* pv. *manihotis* en Amérique du Sud. Oral presentation in: IV éme Congrès de la Société Francaise de Phytopathologie, Nice.
25. Restrepo, S., Verdier, V. and Alvarez, E. 1996. Variabilidad de *Xanthomonas campestris* pv *manihotis* en Colombia. Laboratorio de Patología de Yuca. CIAT. Ascolfi Informa, Volumen 22, No. 1 p. 2-4.
26. Alvarez, E., Mc Gee, D.C., and Harrington, T.C. 1997. Variación Molecular en Aislamientos de *Fusarium* spp. que afectan la calidad de la semilla de maíz. ASCOLFI- Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. July 31.

27. Alvarez, E., Chacón, M.I., Loke, J.B., and Sánchez, N.J. 1997. Genetic variation in strains of *Phytophthora* spp. affecting cassava. American Phytopathological Society - Annual Meeting, 9-13 August, Rochester, N.Y., USA. Phytopathology Vol. 87, No. 6, p. S3 – S4. Publication No. P-1997 – 0020 – AMA.
28. Alvarez, E., and Gómez, P.L. 1997. Sexual compatibility in *Thielaviopsis paradoxa*. American Phytopathological Society - Annual Meeting, 9-13 August, Rochester, N.Y., USA. Phytopathology Vol. 87., No. 6. P. S4. Publication No. P-1997 – 0021 – AMA.
29. Alvarez, E., and Molina, M.L. 1997. Caracterización Morfológica y Molecular de Aislamientos de *Sphaceloma manihoticola* (Bitancourt & Jenkins) en Colombia. ASCOLFI. Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. August 1.
30. Alvarez, E., Chacón, M.I., Loke, J.B., and Gómez, P.L. 1997. Pathogenic and molecular characterization of *Thielaviopsis paradoxa* de la Palma de Aceite. ASCOLFI Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. July 31.
31. Alvarez, E., Chacón, M. I., Loke, J. B., and Gómez, P.L. 1997. Pathogenic and molecular characterization of *Thielaviopsis paradoxa* strains by RAPD and PCR amplification. American Phytopathological Society – Annual Meeting, 9-13 August, Rochester, N.Y., USA. Phytopathology Vol. 87., No. 6. P. S3. Publication No. P-1997 – 0019 – AMA.
32. Alvarez, E., Sánchez, J., Chacón, M. I., and Loke, J.B. 1997. Avances en la Caracterización de Aislamientos de *Phytophthora* spp. el Agente Causal de Pudriciones de Raíces en Yuca. ASCOLFI Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. August 1.
33. Alvarez, E., Ramírez, J.A., and Loke, J.B. 1997. Termoterapia en Semilla Asexual de Yuca para el Control de *Phytophthora* spp. ASCOLFI - Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. August 1.
34. Alvarez, E., Bedoya, F.A., and Loke, J.B. 1997. Control Biológico de la Pudrición Radical en yuca: Selección In Vitro de Aislamientos de *Trichoderma* spp. Memorias XVIII Congreso de Ascolfi. Cali, Colombia. August 1, 1997. P 68.
35. Alvarez, E., Chacón, M. I., Loke, J. B., Castañeda, G.G., Castañeda, D., Gómez, P. L. and Nieto, L.E. 1997. Diversidad Genética y Recombinación Sexual de *Thielaviopsis paradoxa* de la Palma de Aceite. ASCOLFI Congress at the International Center for Tropical Agriculture (CIAT), Cali, Colombia. July 31.
36. Alvarez, E., Chacón, M.I., Loke, J.B., Trujillo, R., Llano, G.A., Villegas, V., Ayala, A., Gómez, P. L., and Nieto, L.E. 1997. Identificación Molecular de *Thielaviopsis paradoxa* Agente causal de la pudrición de cogollo en Palma de Aceite. Centro de Investigación en Palma de Aceite CENIPALMA Reunión Annual Resúmenes Diciembre 11 y 12. Santafé de Bogotá D.C
37. Alvarez, E., Bedoya, F.A., and Loke, J.B. 1997. Control Biológico de la Pudrición Radical en yuca: Selección In Vitro de Aislamientos de *Trichoderma* spp. Memorias XVIII Congreso de Ascolfi. Cali, Colombia. August 1, 1997. P 68.
38. Molina, M.L., Alvarez, E. 1999. Caracterización morfológica y molecular de aislamientos del hongo *Sphaceloma manihoticola* Bitancour & Jenkins, agente causal del superalargamiento en *Manihot esculenta* Crantz. Fitopatologia Brasileira

39. Bedoya, F.A., Escobar, R.H., Alvarez, E., Roca, W. 1999 Criopreservación en nitrógeno líquido de aislamientos de *Phytophthora* spp. Memorias XX Congreso Nacional de Fitopatología Manizales, Colombia
40. Alvarez, E., Llano, G.A. 1999. Investigación participativa para el control de pudrición de yuca en comunidades indígenas de Mitú (Colombia). Proceedings of Simposio Internacional y Talleres sobre Fitomejoramiento Participativo en América Latina y el Caribe: Un intercambio de experiencias, held in Quito, Ecuador, August 31.
41. Sánchez, N.J., Ayala, A., Alvarez, E. 1999. Patogenicidad, identificación y Caracterización molecular de *Phytophthora* spp. en palma de aceite. CENIAVANCES, June
42. Alvarez, E., Claroz, J.L., Loke, J.B. y Echeverri, C. 2000. Diversidad Genética y Patogénica de *Sphaerotheca pannosa* var. *rosae*, Causante del Mildeo Polvoso en la Rosa en Colombia. Memorias XXI Congreso Nacional de Fitopatología y Ciencias Afines. Palmira, Centro Internacional de Agricultura Tropical (CIAT), Septiembre. p. 43.
43. Alvarez, E., Cuero, S.P., Castellanos, G., Claroz, J.L., Llano, G.A., y Loke, J.B. 2000. Potencial de un extracto vegetal y de un fertilizante foliar para el control del Mildeo Polvoso de la rosa causado por *Sphaerotheca pannosa* var. *rosae*, en Colombia. Memorias XXI Congreso Nacional de Fitopatología y Ciencias Afines. Palmira, Centro Internacional de Agricultura Tropical (CIAT), Septiembre. p. 43 y 44.
44. Alvarez, E., Mejía, J.F. y Losada, T. 2000. Caracterización molecular y patogénica de aislamientos de *Sphaceloma manihoticola* de Brazil. Memorias XXI Congreso Nacional de Fitopatología y Ciencias Afines. Palmira, Centro Internacional de Agricultura Tropical (CIAT), Septiembre. p. 47.
45. Alvarez, E., and Mejía, J.F. 2001. Assessing virulence and genetic variability of *Sphaceloma manihoticola*, causal agent of superelongation in cassava, in Brazil and Colombia, using RAMS and AFLP. Salt Lake 2001. APS, SON and MSA Joint Meeting August 25-29. Phytopathology 91:S101. Publication no. P-2001-0004-MSA.
46. Alvarez, E., Grajales, C.X., Villegas, J. Llano, G.A., Loke, J.B. 2001. Control del mildeo polvoso en cultivos de rosa por aplicación de un lixiviado de compost de plátano. Poster presented at the XV Muestra Agroindustrial y Empresarial. Universidad La Gran Colombia, Armenia, Quindío, 1-3 November 2001.
47. Alvarez, E., Loke, J.B., Llano, G.A. 2002. Desarrollo de prácticas ecológicas de manejo de pudrición radical (*Phytophthora* spp.) en yuca (*Manihot esculenta*). Paper presented at the XXIII Congreso Nacional de Fitopatología, held by ASCOLFI, Bogotá, 3-6 July 2002. p. 96
48. Alvarez, E., Grajales, C.X., Villegas, J., Loke, J.B. 2002. Control de mildeo polvoso en rosa (*Sphaerotheca pannosa* var. *rosae*) por aplicación de lixiviado de compost de raquis de plátano. Paper presented at the XXIII Congreso Nacional de Fitopatología, ASCOLFI, Bogotá, 3-6 July 2002. p. 41
49. Llano, G.A., Alvarez, E., Feris, M.C., Hernández, M.L., Rodríguez, S.M. 2002. Evaluación de dos inductores de resistencia para el control de pudrición del cogollo en palma de aceite *Elaeis guineensis* en los Llanos Orientales de Colombia. Paper presented at the XXIII Congreso Nacional de Fitopatología, Nuevas tendencias en Fitopatología. ASCOLFI, Bogotá, 3-6 July 2002. . p. 98
50. Alvarez, E. Claroz, J.L. 2002. Caracterización molecular y clasificación de fitoplasmas asociados con la palma de aceite. Paper presented at the XXIII Congreso Nacional de Fitopatología. ASCOLFI, Bogotá, 3-6 July 2002.

51. Hurtado, P.X., Alvarez, E., Fregene, M., Llano, G.A. 2003. Búsqueda de genes análogos de resistencia asociados con la resistencia al añublo bacterial de la yuca. *Revista Fitopatología Colombiana*. Vol. 27.
52. Hurtado, P.X., Alvarez, E., Fregene, M. 2003. Detección de marcadores microsatélites asociados con la resistencia a *Xanthomonas axonopodis* pv. *manihotis* en una familia de yuca (BC1). *Revista Fitopatología Colombiana*. Vol. 27.
53. Alvarez, JB. Loke, GA. Llano. 2003. Development of ecological practices to manage *Phytophthora* root rot of cassava (*Manihot esculenta*). *ICPP2003 Memories*. Vol 2: 133.
54. Alvarez, E., Llano, G.A., Feris, M.C., Hernández, M.L. and Rodríguez, S.M. 2003. Control of bud rot in oil palm, *Elaeis guineensis*, using resistance inducers. *ICPP2003 Memories*. Vol 2: 179.
55. Alvarez, E., and Claroz, J.L. 2003. Characterization and classification of *phytoplasmas* associated with oil palm (*Elaeis guineensis*). *ICPP2003 Memories*. Vol 2: 284.
56. Alvarez, E., Grajales, C.X., Villegas, J., and Loke, J.B. 2003. Control of powdery mildew in roses by applying lixiviated plantain rachis compost. *ICPP2003 Memories*. Vol 2: 272.
57. Hurtado, P.X., Alvarez, E., Fregene, M., and Llano, G.A. 2003. Detección de marcadores microsatélites asociados con la resistencia al Añublo Bacterial de la yuca (*Manihot esculenta* Crantz) en Colombia. *Memories XXIV Congress of ASCOLFI*. p. 25.
58. Ospina, C.A., and Alvarez, E. 2003. Caracterización genética y patogénica de *Colletotrichum* spp. agente causal de la antracnosis en guanábana (*Anona muricata*) en el Valle del Cauca. *Memories XXIV Congress of ASCOLFI*. p. 6
59. Llano, G.A., Alvarez, E. 2003. Assessment of integrated management practices of cassava root rots, by participatory research with indigenous from Mitú, colombian noreast amazon. *Agren. Agricultural research and extension network*. Submitted.
60. Loke, J.B., Alvarez, E., Corredor, J.A., Folgueras, M., Jaramillo, G. and Ceballos, H. 2004. Preliminary evidence of correlation between foliar and root resistance to root rot caused by *Phytophthora tropicalis* in cassava. *Abstracts VI International Scientific Meeting of the Cassava Biotechnology Network, Cali – Colombia*. Pag 79
61. Llano, G., Alvarez, E., Fregene, M. and Muñoz, J.E., 2004. Identification of resistance-gene analogs in cassava (*Manihot esculenta* Crantz), and their relationship to three *Phytophthora* species. *Abstracts VI International Scientific Meeting of the Cassava Biotechnology Network, Cali – Colombia*. Pag 121
62. Loke, J.B., Alvarez, E., Fregene, M., Rivera, S., Llano, G. and Mejía, J.F., 2004. QTL mapping for resistance to root rot caused by *Phytophthora tropicalis* in cassava. *Abstracts VI International Scientific Meeting of the Cassava Biotechnology Network, Cali- Colombia*. Pag 158
63. Loke JB; Pérez JC; Alvarez E; Cuervo M; Mejía JF; Llano G.; Pineda B. 2004. Cuero de Sapo: Una Enfermedad de la Yuca -Once Preguntas Muy Interesantes de Agricultores-. Poster presented June 5 during the release of new cassava varieties
64. Alvarez E. and Ospina C.A. 2004. Morphological, genetic, and pathogenic characterization of *Colletotrichum gloeosporioides*, causal agent of anthracnose in soursop (*Annona muricata*) in the production areas of Valle del Cauca, Colombia. *Plant. Dis.*
65. Loke JB; Alvarez E; Vallejo FA; Marín J; Fregene M; Rivera S; Llano GA. 2004. Análisis de QTLs de la resistencia a pudrición de raíz causada por *Phytophthora tropicalis* en una población segregante de yuca (*Manihot esculenta* Crantz). *Acta Agron.*

66. Arenas A; López D; Llano GA; Alvarez E; Loke JB. 2004. Efecto de prácticas ecológicas sobre la población de *Ralstonia solanacearum* Smith, causante de Moko de plátano. Memorias XXV Congreso ASCOLFI, CIAT- Palmira.
67. Llano GA; Alvarez E; Loke JB; Fregene M; Muñoz, J.E. 2005. Identificación de genes análogos de resistencia y QTLs asociados con resistencia a enfermedades de yuca. IX Congreso Asociación Colombiana de Fitomejoramiento y pudrición de Cultivos Corpoica, Palmira. Mayo 11 al 13 de 2005.
68. Loke, J.B; Corredor, J.; Alvarez, E.; Sánchez, T.; Folgueras, M. 2005. La escopoletina como indicadora para la resistencia a la pudrición de la raíz por *Phytophthora tropicalis* en yuca (*Manihot esculenta* Crantz) IX Congreso Asociación Colombiana de Fitomejoramiento y pudrición de Cultivos. Corpoica, Palmira. Mayo 11 al 13 de 2005
69. Alvarez E; Loke JB; 2005. Managing Cassava diseases transmitted through asexual seed Abstrac booklet. 5th ISTA- SHC Seed Health Symposium. Angers, Francia 10-13 Mayo, 2005

REFERENCES

Dr. Denis McGee
Professor Seed Science Center
Iowa State University
Ames, IA. 50011
(Major Professor for Ph.D)

Phone: 515-294-7560
Fax: 515-294-2014
e-mail: denismcgee@iastate.edu

Dr. Robert Zeigler
Director of IRRI
Los Baños, Philippines

e-mail: rzeigler@cgiar.org

Dr. Douglas Pachico
Director of Research
CIAT, Cali- Colombia

Phone: 572-445 0043
Fax. 572-4450073
d.pachico@cgiar.org

ADDRESS

International Center For Tropical Agriculture (CIAT)

Km 17 Recta Cali- Palmira

E-mail: e.alvarez@cgiar.org

Phone: 572-4450000 Ext. 3385

Fax: 572-4450073

A.A. 6713

Cali, Colombia

South America