

RESUME

CARLOS A. IGLESIAS

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SPECIALIZATION: *Plant Breeding/Crop Physiology/Agronomy/Business Development*

CAREER GOAL: *To lead global, multi-disciplinary programs focused on developing technologies that improved the livelihood of farmers, workers and consumers and enhance the economic development of target regions/countries.*

WORK AND RESEARCH EXPERIENCE: **NORTH CAROLINA STATE UNIVERSITY**

Raleigh, NC (01/01/20-present)

Professor in Horticulture – Director Plant Breeding Consortium

(See Appendix- Summary of achievements)

Syngenta Seeds

Minnetonka, MN/RTP, NC (08/01/2017-12/31/19)

Head NA Cereals Business Unit

Junction City, KS (03/01/2105 – 07/31/2017)

Head NA Wheat Breeding

Uberlandia, Brazil (02/01/2012-02/28/2015)

Head R&D Corn, LATAM

Coordinator of all R&D corn breeding strategies and activities in Latin America and cereals technologies in North America.

Weaver Popcorn Company

New Richmond, IN (1998-2012)

Hybrid Research & Seed Production Director

Director of popcorn hybrid research, popcorn breeding programs abroad, the genetics of new-product development, and seed production.

Centro Internacional de Agricultura Tropical (CIAT) Cali, Colombia (1989-1998)

Lead, Cassava Global Germplasm Development

Leader of the Global Cassava Genetic Improvement Project, with major responsibilities in Latin America, and close cooperation with Africa and Asia.

Iowa State University, Ames, IA (1986-1989)

Graduate Research Assistant

Responsible for development of improved maize population using S2 recurrent selection and exotic germplasm.

Universidad de la República de Uruguay

Montevideo, Uruguay (1981-1986)

Teaching and Research Assistant

Responsible for teaching a course on Plant Breeding and the collection, characterization, maintenance and use of Uruguayan maize and forage germplasm; wild potato and peanut collections; and yerba mate introgressions.

EDUCATION : MS in Ag Economy (Aug. 2014) and MBA in Food and Agribusiness Management (Nov. 2014). Kelly School of Business-**IU and Purdue** Center for Food and Agricultural Business. (2012-14), (GPA: 4.0)

Ph.D. Major: Cytogenetics and Plant Breeding
 Minor: Crop Management and Physiology
Iowa State University, Ames, IA, 1989. (GPA: 3.99)

M.S. Cytogenetics and Plant Breeding
Iowa State University, Ames, IA, 1987. (GPA: 4.0)

B.S. Agronomy
 Universidad de la República, **Uruguay**, 1983
 (Equivalent GPA: 3.9)

AWARDS AND MEMBERSHIPS: Iowa State Univ. Research Excellence Award (Dec. 1987).

Iowa State Univ. Research Excellence Award (May 1989).

1988 C.R. Weber Award (Agronomy-ISU).

Honor Society of Agriculture Gamma Sigma Delta, (April, 1988).

CONSULTING & BOARD OF DIRECTORS APPOINTMENTS: 1997: Consultancy with CENIPALMA (Palm oil research center) Oil palm improvement program.

2009-13: Member of the Board of Directors of Indiana Crop Improvement Association.

2008-present: Serve as a project reviewer and technical advisor to the Bill & Melinda Gates Foundation: Africa Yam and NextGen Cassava

2009-10 serve as a consultant to the Cooperative State Research, Education, and Extension Service (CSREES-USDA) – Potato projects

LANGUAGES: Spanish - Excellent
 English - Excellent
 Portuguese - Excellent
 French - Basic understanding
 Italian - Basic understanding

CITIZENSHIP: Uruguayan/American

COUNTRY OF RESIDENCY: American citizenship (02/08/2010)

OTHER PERSONAL INFORMATION: Divorced/Married, 3 children

HOBBIES: Vegetable gardening, bread baking, sports (*squash*), reading, and leather crafting.

**REFERENCE
PERSONS:**

- **Jim Lorenzen**; Senior Program Officer; Bill & Melinda Gates Foundation. (Jim.Lorenzen@gatesfoundation.org).
- **Dan Dyer**; Former Global Head R&D Seeds; Syngenta. (dverbellybutton@gmail.com).
- **Hernan Ceballos**; Head Global Cassava Breeding; CIAT. (h.cebvallos@cgiar.org).
- **Rupert Best**; Former Head of Cassava Program; CIAT (rupertbest@gmail.com).
- **Mike Hacker** Former Head Field and R&D; Weaver Popcorn Co (mhacker@welira.com).

PUBLICATIONS: *Reprints and copies upon request. With a few exceptions most of the publications were the product of the work done between 1989 and 1998 as a cassava breeder at CIAT, for a total of 20 refereed papers and 9 book chapters.*

Refereed Journals

Iglesias C & AR Hallauer. 1989. S2 recurrent selection in populations with exotic germplasm. *Maydica* 34:133-140.

Iglesias C & AR Hallauer. 1991. Response to S2 selection in exotic and semi-exotic populations of maize (*Zea mays* L.). *J Iowa AcadSc* 98:4-13.

Angel F; D Arias; J Thome; **C Iglesias**; & W Roca. 1993. Toward the construction of a molecular map of cassava (*Manihot esculenta* Crantz) comparison of restriction enzymes and probe sources in detecting RFLP's. *Journal of Biotechnology*. 31:103-113.

Iglesias C; F Calle; C Hershey; G Jaramillo; & E Mesa. 1994. Sensitivity of Cassava (*Manihot esculenta* Crantz) genotypes to environmental changes. *Field Crop Research*. 36:213-220.

Iglesias C; C Hershey; F Calle; & A Bolaños. 1994. Propagating cassava (*Manihot esculenta* Crantz) by sexual seed. *Exp. Agric*. 30:283-290.

O'Brien GM; C Wheatley; **C Iglesias**; & NH Poulter. 1994. Evaluation, modification and comparison of two rapid assays for cyanogens in cassava. *J Sci Food Agric* 65:391-399.

Iglesias C; J Mayer; L Chavez; & F Calle. 1997. Genetic potential and stability of carotene content in cassava roots. *Euphytica* 94:367-373.

Yeoh HH; T Sanchez; & **C Iglesias**. 1998. Cassava linamarase for enzymic determination of cyanide. *Trop Sci* 38:91-96.

Yeoh HH; T Sanchez; & **C Iglesias**. 1998. Large-scale screening of cyanogenic potential in cassava roots using the enzyme-based dipsticks. *J Food Comp. and Analysis* 11:2-10.

Thro AM; W Roca; **C Iglesias**; G Henry; & SYC Ng. 1998. Contributions of *in-vitro* biology to cassava

improvement. *African Crop Science Journal* 6:303-315.

- Graham R; C Senadhira; S Beebe; **C Iglesias**; & I Monasterio. 1999. Breeding for micronutrient density in edible portions of staple food crops: conventional approaches. *Field Crops Research* 60:57-80.
- Roa AC; P Chavarriaga-Aguirre; MC Duque; MM Maya; MW Bonierbale; **C Iglesias**; & J Tohme. 2000. Cross-species amplification of cassava (*Manihot esculenta*) (Euphorbiaceae) microsatellites: allelic polymorphism and degree of relationship. *American Journal of Botany* 87:1647-1655.
- Chávez,A.L., J.M. Bedoya, T. Sánchez, **C. Iglesias**, H. Ceballos and W.Roca. 2000. Iron, carotene, and ascorbic acid in cassava roots and leaves. *Food and Nutrition Bulletin* Vol. 21, No 4: 410-413.
- Goncalvez-Fukuda WM, S. Oliveira and **C. Iglesias**. 2002. Cassava Breeding. *Crop Breeding & Applied Biotechnology* 2:617-638.
- Cortes DF, K Reilly, E Okogbenin, JR Beeching, **C Iglesias** and J Tohme. 2002. Mapping wound-response genes involved in post-harvest physiological deterioration (PPD) of cassava (*Manihot esculenta* Crantz). *Euphytica* 128:47-53.
- Ceballos H, **C Iglesias**, JC Perez and AGO Dixon. 2004. Cassava breeding: opportunities and challenges. *Plant Molecular Biology* 56:503-516.
- Chavez, AL; T Sanchez; G Jaramillo; JM Bedoya; J Echeverry; EA Bolanos; H Ceballos, H; & **C Iglesias**. 2005. Variation of quality traits in cassava roots evaluated in landraces and improved clones. *Euphytica* 143:125-133.
- Okogbenin, E; MCM Porto; C Egesi; C Mba; E Espinosa; LG Santos; C Ospina; J Martin; E Barrera; J Gutierrez; I Ekanayake; **C Iglesias**; and MA Fregene. 2007. Marker-assisted Introgression of resistance to Cassava Mosaic Disease into Latin American germplasm for the genetic improvement of cassava in Africa. *Crop Sci.* 47:1895-1904.
- Iglesias C** and J Sesmero. 2014. Economic analysis of supplementing sugarcane with corn for ethanol production in Brazil: a case study in Uberaba. *BioEnergy Research On line* (Vol 7-3: 19p).
- H. Ceballos, C. Rojanaridpiched, C. Phumichai, P. Kittipadakul, **C. Iglesias**, and V.E. Gracen. 2019. Excellence in cassava breeding: perspectives for the future. *Crop Breeding, Genetics, and Genomics* (*submitted Sept. 2019*).

Book Chapters

- Bonierbale MW; **C Iglesias** & K Kawano. 1994. Genetic resource management of cassava at CIAT. MAAF International Workshop on Genetic Resources, Root and Tuber Crops. Tsukuba, Ibaraki, Japan. pp. 39-52.
- Iglesias C**; M Bonierbale; M El-Sharkawy; C Lozano; A Bellotti; & C Wheatley. 1995. Focusing basic research for cassava varietal improvement. In: Howeler R (ed). *Cassava Breeding, Agronomy Research and Technology Transfer in Asia*, CIAT, Bangkok, Thailand. pp 40-60.

- Iglesias C**; J Bedoya; N Morante; & F. Calle. 1996. Genetic diversity for physiological deterioration in cassava roots. In: Kurup, GT et al. Tropical Tuber Crops: Problems, prospects and future strategies. Science Publishers Inc. Lebanon, NH, USA. pp. 115-126.
- Second G & **C Iglesias**. 2001. The state of use of cassava genetic diversity and a proposal to enhance it. In Cooper D; Spillane C. & Hodgkin T (eds) Broadening the Genetic Base of Crop Production. CABI Publishing, Wallingford, UK (pp. 201-221).
- Jennings DL & **C Iglesias**. 2001. Breeding for Crop Improvement. In Hillocks RJ, Thresh JM & Bellotti AC (eds). Cassava: Biology, Production and Utilization. CABI Publishing, Wallingford, UK (pp. 149-166).
- Fukuda, WMG & **C Iglesias**. 2005. Melhoramento de Mandioca. In. Borem, A. (Ed.) Melhoramento de cultivos. Editora UFV, Parana, Brazil. (pp. 453-490).
- Fukuda, WMG & **C Iglesias**. 2006. Recursos Geneticos. In. da Silva Souza et al. (Eds.) Aspectos Socioeconomicos e Agronomicos da Mandioca. EMBRAPA-CNPMPF; Cruz das Almas, BA, Brazil. (pp. 301-323).
- Fukuda, WMG & **C Iglesias**. 2006. Melhoramento Genetico. In. da Silva Souza et al. (Eds.) Aspectos Socioeconomicos e Agronomicos da Mandioca. EMBRAPA-CNPMPF; Cruz das Almas, BA, Brazil. (pp. 324-363).
- Fukuda, WMG; **C Iglesias**; C. Fukuda & R. Correa-Caldas. 2006. Melhoramento Participativo. In. da Silva Souza et al. (Eds.) Aspectos Socioeconomicos e Agronomicos da Mandioca. EMBRAPA-CNPMPF; Cruz das Almas, BA, Brazil. (pp. 751-780).

Contributions to Proceedings from scientific meetings and variety release announcements

- Iglesias C**. 1992. Caracterización de regiones de cultivo de la yuca. (*Characterization of major cassava growing regions*) In: **Iglesias C** & W Fukuda (eds). Memorias de la Segunda Reunión Panamericana de Fitomejoradores de Yuca, Cruz das Almas, Bahia, Brazil. CIAT, Cali, Colombia. Working Document 112. p 137-146.
- Iglesias C**. & F Calle. 1992. Lanzamiento de variedades de yuca para los Llanos Orientales. (*New cassava variety for acid soils*) In: Hernández L (ed). Participación de los Productores en la Selección de Variedades de Yuca. CIAT, Cali, Colombia. p 69-78.
- Iglesias C** & M Iwanaga. 1993. Cassava genetic resources. In: Roca W & Thro AM (eds). Proceedings of the first international scientific meeting of the Cassava Biotechnology Network, Cartagena, Colombia, 25-28 August 1992. Centro Internacional de Agricultura Tropical. Cali, Colombia. Working Document 123. p. 47-50.
- Henry G & **C Iglesias**. 1993. Problems and opportunities in cassava biotechnology. In: Roca W & Thro AM (eds). Proceedings of the first international scientific meeting of the Cassava Biotechnology Network, Cartagena, Colombia, 25-28 August 1992. Centro Internacional de Agricultura Tropical. Cali, Colombia. Working Document. 123. p 453-461.
- Angel F; F Giraldo; R Gómez; **C Iglesias**; J Thome; & W Roca. 1993. Use of RFLPs and RAPDs in cassava genomic studies. In: Roca W & Thro AM (eds). Proceedings of the first international scientific meeting of the Cassava Biotechnology Network, Cartagena, Colombia, 25-28 August

1992. Centro Internacional de Agricultura Tropical. Cali, Colombia. Working Document 123. p 62-68.

Ocampo C; C Hershey; **C Iglesias**; & M Iwanaga. 1993. Esterase isozyme fingerprinting of the cassava germplasm collection held at CIAT. In: Roca W & Thro AM (eds). Proceedings of the first international scientific meeting of the Cassava Biotechnology Network, Cartagena, Colombia, 25-28 August 1992. Centro Internacional de Agricultura Tropical. Cali, Colombia. Working Document 123. p 81-89.

Iglesias C. 1994 (Editor) Memorias de la Tercera Reunion Panamericana de Fitomejoradores de Yuca. (*Proceedings from the Thrid Panamerican Cassava Breeders Meeting*) CIAT, Cali, Colombia. 279 p.

Iglesias C & M. Iwanaga 1994 (Editors) Proceedings of an International Symposium of Manihot Genetic Resources. IPGR, Rome. 180 p.

Iglesias C & L Hernández. 1994. Introducción de diversidad genética mejorada a nivel de campo. (*Introduction of improved genetic diversity at field level*) In: Iglesias C (ed). Memorias de la Tercera Reunión Panamericana de Fitomejoradores de Yuca, CIAT, Cali, Colombia. pp 151-158.

Hershey C; **C Iglesias**; M Iwanaga; & J Thome. 1994. Definition of a core collection for cassava. In: Iglesias, C. and M. Iwanaga (eds). Proceedings of an International Symposium of Manihot Genetic Resources. IPGR, Rome. pp 145-156.

Iglesias C & LA Hernandez. 1997. Methodology development issues for participatory plant breeding of root and tuber crops. In Ashby, J., Sperling L. & Carney D. (Eds) International Seminar on Participatory Research an Gender Analysis for Technology Development. New frontiers in participatory research and gender analysis for technology development. CIAT, Cali, Colombia. 280 p.

Fukuda WMG, JA Magalhaes, J Cavalcanti, PR Pina, JA Tavares, **C Iglesias**, LA Hernandez Romero and EE Montenegro. 1997. Pesquisa Paricipativa em melhoramento de mandioca: uma experiencia no semi-arido do Nordeste do Brasil. CNPMF Doc. 73. Cruz das Almas, Bahia, Brasil.

Iglesias C; JI Lenis & F Calle. 1998. Estructuracion de un programa de mejoramiento y multiplicacion de semilla de yuca en la Costa Atlantica Colombiana. (*Structure of a cassava breeding and seed multiplication program for the Atlantic Coast of Colombia*) In. Cardona A (ed) Primer encuentro Tecnico Nacional de Produccion y Transformacion de Yuca. Bogota, Colombia. pp 59-73.

Iglesias C; F Calle; J Bedoya; N Morante & G Jaramillo. 1998. Perspectiva de la investigacion en yuca en Colombia (*Perspectives for cassava research in Colombia*) In. Cardona A (ed) Primer encuentro Tecnico Nacional de Produccion y Transformacion de Yuca. Bogota, Colombia. pp 77-88.

Fukuda WMG; M Souza; R Correa; LA Hernandez & **C Iglesias**. 1999. Analise de Preferencia de novos clones de mandioca avaliados em provas participativas com agricultores nos tabuleiros costeiros do estado da Bahia. (*Preference analysis of new cassava clones evaluated in farmer participatory trials in coastal regions of the State o Bahia*) EMBRAPA, CNPMF, Cruz das Almas,

- C Iglesias** & LA Hernandez. 2000. Mejoramiento participativo del cultivo de yuca en América Latina y el Caribe como Interfase entre mejoradores, agricultores y mercados (*Cassava participatory improvement in Latin America and the Caribbean as an interface between breeders, farmers and the market*). In Simposio Internacional y Talleres sobre Fitomejoramiento Participativo (FMP) en América Latina y el Caribe: Un Intercambio de Experiencias. PRGA & CIAT, Cali, Colombia (CD ROM).
- Lopez AJ; LA Hernandez & **C Iglesias**. 2000. Selección Participativa con Agricultores de Variedades de Yuca en la Región Caribe de Colombia (*Participatory selection of cassava varieties involving farmers in Northern Colombia*). In. Simposio Internacional y Talleres sobre Fitomejoramiento Participativo (FMP) en América Latina y el Caribe: Un Intercambio de Experiencias. PRGA & CIAT, Cali, Colombia (CD ROM).
- Fukuda WMG, **C Iglesias** and S Oliveira e Silva. 2003. Melhoramento de Mandioca. CNPMF Doc. 104. Cruz das Almas, Bahia, Brasil.
- Fukuda WMG, JA Tavares and **C Iglesias**. 2003. MANI BRANCA: Novo híbrido de mandioca recomendado para as condicoes semi-aridas do Nordeste. Folder, CNPMF, Cruz das Almas, Bahia, Brazil.
- Fukuda WMG, JA Tavares and **C Iglesias**. 2003. ARARI: Cultivar de mandioca recomendada para as condicoes semi-aridas da chapada do Araripe. Folder, CNPMF, Cruz das Almas, Bahia, Brazil.
- Fukuda WMG, SL Oliveira; **C Iglesias**; and CM da Silva. 2005. MULATINHA: Novo híbrido recomendado para o semi-arido Baiano. Folder, CNPMF, Cruz das Almas, Bahia, Brazil.
- Fukuda WMG, SL Oliveira; and **C Iglesias**. 2005. PRATA: Nova Opcao para o semi-arido Baiano. Folder, CNPMF, Cruz das Almas, Bahia, Brazil.

VARIETIES/HYBRIDS RELEASED: (cassava and wheat varieties officially registered/
PVP; popcorn and corn hybrids kept exclusive to company, not patented)

Total of 78 cultigens released:

Cassava (1989-1998):

Varieties released 7: (Estimated generated value as 2000 **\$2.05 M**)

ICA-Catumare; ICA-Cebucan; Corpoica-Negrita; Mani Branca, Mulatinha, Prata, Arari

Germplasm released 17:

3 Whitefly resistant; 5 high carotene content in roots; 3 semi-dwarf plant type; 1 cytoplasmic male sterile clones; 3 high quality frozen products; 2 high phosphorylated starch clones

Popcorn (1998-2012):

Hybrids commercialized 7: (Generated value as 2012: **\$3.89 M**)

W101; W133; W132; W226; W163; W305; W308

Germplasm 10:

4 high popping parental lines W-HP1 through 4); 6 up-right leaf small tassel lines (W-ULST1 through 6).

Field corn (2012-2015)

Hybrids commercialized 4: (Generated value as 2017: **\$5.89 M**)

SYN Supremo; SYN Formula Vip; SYN 840 and SYN 900 Vip

Wheat (2015-2019)

Varieties commercialized 12: (Generated value as of 2018: **\$5.38 M**)

SY Sunrise; SY Benefit; SY Achieve CL2; SY Legend CL2; SY Valda; SY Rockford; SY 605CL; SY Raptor; SY Redeye, SY Teton; SY Coho; SY Gunsight.

Lines released for licensing 8 (coded):

AP-09-12; AP-09-23; AP-10-38; AP-10-45; AP-10-52; AP-11-17; AP-11-28; AP-11-46

Hybrid wheat germplasm 13 (coded):

CMS elite testers: ANP-24-211; ANP-V2-12; ANP-22-17; ACP-11-17; ACP-33-36; APW-A3-24.
Optimal restoration stack lines: RNP-06-22; RPN-11-13; RPN-25-07; RPN-38-11; RCP-W3-22; RCP-W6-17; RPW-22-94

SUMMARY OF ACHIEVEMENTS

Facultad de Agronomía. URUGUAY (1981-1986). Taught an undergrad course and run greenhouse experiments with students interested in pursuing a career in Plant Breeding. Collection, characterization and use of germplasm resources was the core of my research. Conceptualizing and getting funds for the introduction of Yerba Mate in Uruguay was the highlight of my career at the University, given the relevance of mate for Uruguayan people.

a.1) Systematic approach for the preservation, evaluation and improvement of priority maize land races within the Uruguayan germplasm established. The focus of the evaluation and selection work were composite populations of red and orange flint corn. Some of those land races have contributed to the Germplasm Enhancement of Maize project in the US.

a.2) Accessions of native potato (232), peanut (128) and apomictic grasses (387) germplasm collected, characterized and evaluated. Accessions were deposited in international germplasm collections and contributed to the overall genetic wealth of those species. Core collection concepts developed for those species.

a.3) A project for the introduction, evaluation and development of the “yerba mate” (*Ilex paraguariensis*) crop in Uruguay was initiated.

a.4) Teaching materials and classes for the undergraduate course in Plant Breeding.

Iowa State University. USA (1986-1989). I researched the role of introducing inbreeding generations to enhance the genetic gains in recurrent selection schemes. That knowledge has guided the work I have done and supervise to reduce negative genetic load in crops such as cassava and wheat.

b.1) Genetic gains from inbred-family recurrent selection programs involving exotic germplasm, evaluated (*see publications Iglesias and Hallauer, 1989 and 1991*).

b.2) Assist managing inbred development for the corn-breeding program at ISU, under a research assistantship.

Centro Internacional de Agricultura Tropical (CIAT). Colombia (1989-1998). Breeding cassava for three different continental target markets in the world taught me about the relevance in connecting with farmers and downstream users of the crop. We developed the first molecular map for cassava and used to breed germplasm with resistance to Cassava Mosaic Disease in Latin America in the absence of the disease. I closely worked with industrial sectors to tailor cassava genetics to their needs for different processes (dry cassava chips, frozen cassava, starch, etc.)

c.1) Improved cassava germplasm for different ecosystems developed in Colombia and shared with all the major cassava programs in the world, with special emphasis in Sub-Saharan Africa. An average of 4,200 crosses and 238,000 seeds shipped per year to collaborating institutions.

c.2) National programs in Latin America and Asia, and IITA (International Institute for Tropical Agriculture) in Africa strengthen for the evaluation and selection of new cassava varieties with economic significance to the regional growing and market conditions.

c.3) Direct participation in the development, evaluation, selection and launch of cassava varieties in Colombia and Brazil (*See varieties/hybrids released list and impact*).

c.3) Established a network of cassava breeders in Latin America and Asia, sharing of information, germplasm exchange and farmer participatory cassava breeding experiences.

c.4) Addressed new added-value markets for cassava through germplasm development and synergies with industry and consumer groups. Clones for special uses (animal feed, starch industry, frozen cassava) selected and release in Colombia and Brazil.

c.5) Foundation work for the development and use of the first cassava molecular map. The main application of the molecular work at CIAT enabled selecting for Cassava Mosaic Disease resistance in Colombia, prior to sharing germplasm with IITA in Nigeria (*Angel et al 1993; Okogbenin et al 2007*)

c.6) Pioneer in securing special project funding for CIAT and its National partners, since the early 1990's; with special emphasis in Africa and NE Brazil (IFAD financed project, 8 years at \$ 2 M/year)

c.7) Founding bases for the development of CLAYUCA (Latin American Consortium for Research and Development in Cassava), established. CLAYUCA has become a key driver for feedback and funding of research, as well as dissemination of results (www.clayuca.org).

c.8) Founding researcher for the Harvest Plus (genetic improvement of key nutritional components in crops) project through work on carotene content improvement in cassava (*See publications (Iglesias et al 1997; Chavez et al 2000; and www.harvestplus.org*).

c.9) Crosses to wild species within the *Manihot* genus (*M. grahamii*, Ceara rubber) and from related genera (*H. brasiliensis*, rubber tree), to induce haploidy and exploit genetic variation.

Weaver Popcorn Company. USA (1998-2012). Having been very successful in launching superior hybrids for the key popcorn market segments earlier on, allowed me to focus in basic research projects. The highlight was a project aimed at drastically changing the plant type of popcorn by introducing mutations and breeding for shorter plant types, upright leaves, smaller tassels, and larger root systems. This work was right at the intersection of my graduate education background in Plant Breeding and Plant Physiology.

d.1) Hybrids developed and promoted for the major target markets (microwave, concession, snack and Caramel & Sweet), bringing significant benefits to the Company (*See varieties/hybrids released list and impact*).

d.2) New market opportunities explored through the development of new genetics in popcorn and other specialty corns. Pioneer work was started in 2002 for the development of specialty corn snack hybrids, and novel puffed snacks.

d.3) Global testing program established and knowledge generated for our Company's

international business. Testing established in Argentina, Brazil, France, Italy, Austria, Hungary, Turkey, Greece and China.

d.4) Genetic base of popcorn broadened through the introduction of exotic germplasm and biotechnology events. I worked with the following events: RoundUp Ready and Mon 810 (Monsanto), Liberty Link and Liberty resistance (Bayer), BT11 and Agri-Sure GT from Syngenta.

d.5) Introgression and/or testing of the following corn traits: Resistance to IMI herbicides (BASF); cytoplasmic male-sterility, indeterminate gametophyte (ig), and dent sterility (Ga1).

d.6) Significant contributions made to product quality testing and marketing of new products. Testing on the interaction between hybrids and packaging, shelf life, type of oils, etc., has yielded considerable breakthroughs to the Company.

d.7) Conceptualized and implemented a program for the improvement of plant architecture in popcorn, with emphasis on up-right leaves and reduce tassel size. Hybrids with improvements for those traits were developed and tested before my departure.

d.8) Implement several projects with the assistance of molecular markers for the detection and introgression of favorable QTL's.

d.9) Study the potential contribution of wild species of the genus *Zea* to the improvement of popcorn and the potential determination of QTL's for traits of economic relevance.

d.10) Coordinate seed production, with the objective of maintaining high levels of seed quality, reducing production cost and offering farmers the latest in seed treatment.

Syngenta Seeds. Brazil/USA (2012-2019) The Yield-by-Design corn project allowed me to continue the work in Plant Breeding and Plant Physiology, while helping the team address the major market demands in Latin America. The highlight of my career at Syngenta has been the work in developing hybrid wheat as an alternative technology for wheat farmers. Addressing the challenges of gene pool definition and selection for combining ability; lowering production costs; and maintaining processing quality have been the focus of our work. One of the main contributions I made was replacing chemical hybridization in early stage parent development by 3-way hybrid testing, which also open the door to novel ways of collaboration with other

e.1) Coordinate corn breeding research (strategic goals, infrastructure, personnel and deliverables) in Latin America (lead 7 breeding programs for strategic market segments). Significant market share realized in Brazil (particularly in Safrinha system), and Argentina; (See *varieties/hybrids released list and impact*).

e.2) Assist in the development of a corn seed business plan for South Africa and Eastern Africa, in collaboration with MRI in Zambia.

e.3) Establish a collaborative network of scientist to work in the "Yield-by-Design" strategic pillar, aiming at brining step changes in plant physiology and plant architecture for corn yield improvement.

e.4) Develop and promote a business case for the use of Enogen corn technology as a

complement to sugar cane fermentation in ethanol production in Brazil.

e.5) Coordinate end-to-end development and deployment for advanced technologies in cereals North America.

e.6) Lead wheat breeding in North America focusing on the development and deployment of hybrid wheat technology in North America; (*See varieties/hybrids released list and impact*).

e.7) Lead a group of 20 wheat scientists; 30 assistants; 5 agronomists and 12 key account leads to help them select and promote high performing varieties and hybrids to sustain and improve Syngenta's leading wheat seed market position in NA.

e.8) Fostered implementation of genomic selection across wheat programs in NA, with particular emphasis in quality attributes and yield.

e.9) Developed and promoted the concept of a hybrid wheat platform that could enable other market players to enter the hybrid market, while aligning gene pool development and realizing higher genetic gains.

e.10) Established partnerships with university, and international organizations.

e.11) Establish comprehensive collaborative agreements with major competitors to explore synergies and speed up the time to market for hybrid wheat.

a) Private Initiatives. USA (2004-2012).

f.1) Develop populations, parental inbreds and hybrids with high levels of anthocyanins and other anti-oxidants aiming at the food and feed market (stopped when joined Syngenta under non-compete agreement). High anti-oxidant feeds for animals to enhance the wellbeing of animals and increase production efficiency is an area that has great potential to integrate different functional scientific areas, which I am hoping to retake once I depart Syngenta.