

CARLOS J. FERNANDEZ

Associate Professor - *Research Agronomist*, Plant Physiology and Crop Systems Research
Texas A&M AgriLife Research and Extension Center, Corpus Christi

Education/Training

- 1989: Ph.D., Texas A&M University, Department of Soil and Crop Sciences.
- 1977: M.S., Texas A&M University, Department of Soil and Crop Sciences.
- 1970: Ing.Agr., Universidad de la Republica O. del Uruguay, Facultad de Agronomia.

Positions and Employment

- 08/1999 - present: Associate Professor, Plant Physiology and Crop Systems Research, Texas AgriLife Research and Extension Center at Corpus Christi, TX.
- 09/1991 - 07/1999: Assistant and Associate Professor, Physiology and Management of Crop Stress, Texas AgriLife Research and Extension Center at Uvalde, TX.
- 09/1989 - 08/1991: Post-Doctoral Research Associate, Physiology of Crop Stress, Department of Soil and Crop Sciences, Texas A&M University, College Station, TX.
- 01/1986 – 08/1989: Graduate Research Assistant, Crop Physics, Department of Soil and Crop Sciences, Texas A&M University, College Station, TX.
- 01/1979 – 10/1985: Professor, Ecology, Facultad de Agronomia, Universidad de la Republica O. del Uruguay, Montevideo, Uruguay.
- 01/1979 – 07/1983: Administrative Director, Facultad de Agronomia, Universidad de la Republica O. del Uruguay, Montevideo, Uruguay.
- 03/1970 – 12/1978: Research Scientist, Agricultural Climatology, Centro de Investigaciones Agricolas "A. Boerger" at La Estanzuela and Las Brujas, Ministerio de Agricultura y Pesca, Uruguay.

Program Overview

General focus on farming systems research involving agronomic research, crop management, and applications of precision farming technologies to field crops in the lower Coastal Bend region of Texas. More recent specific research focus include development of Web-based decision support system for crop managers (weather station network, simulation models), drought tolerance in cotton and sugarcane, and physiological responses of microalgae to environmental production factors (light, temperature, and supply of nutrients and CO²), remote sensing of crops for high-throughput phenotyping and field diagnosing of plant growth and development.

Significant 5 Year Accomplishments

Acquired \$710,642 of funds to support research program. *Web-based Decision Support System for Crop Management*. The Crop-Weather Program for South Texas (CWP) was launched in March 2000 to provide researchers and crop manager's easy access to (a) weather data collected by a network of weather stations located in coastal croplands and (b) a suite of powerful numerical calculation/simulation tools for generating field-specific information regarding the crop growth and development and its environment. After 16 years, CWP continues to be a robust, reliable, and expandable Web-based tool for researchers and crop managers. *Drought Tolerance Research*. Designed and built the fully automated Drought Tolerance Laboratory to study whole-plant water economy and drought tolerance in crop plant species. Cotton drought tolerance studies were conducted in collaboration with Drs. J. Dever, S. Hague, T. Cothren, G. Ritchie, and N. Rajan. Other limited studies included sugarcane transgenic genotypes in collaboration with Drs. E. Mirkov and J. Da Silva. Drought tolerant genotypes have been identified, two cotton genotypes showed higher water use efficiency as a result of higher biomass partition into seedcotton, and two transgenic sugarcane varieties also showed higher WUE efficiency as they lower water loss but maintained biomass production. *Microalgae Physiology Research*. Designed and built automated system of controlled-environment bioreactors to quantify growth responses of microalgae

cultures (population dynamics and biomass accumulation) to photosynthetic photon flux density, temperature, pH, salinity, carbon dioxide and nutrients supply. Quantified responses of *Nannochloropsis salina* to light and temperature and integrated these into a mechanistic simulation model. Maximum production of 290×10^6 cells/ml and ash-free dry biomass of 1.86 g/L was obtained in bioreactors with a combination of incident light of $512 \mu\text{E m}^{-2} \text{ s}^{-1}$ and culture temperature of 15C, which is a 1.7 increase over that of outdoor raceways. The simulation model is capable of generating basic trends of light dynamics, growth, and lipid production.

Publications

Ten most recent publications

- Fromme, D.D., L.L. Falconer, R.D. Parker, R.G. Lemon, **C.J. Fernandez**, and W.J. Grichar. 2014. Effects of Two Planting Patterns and Plant Densities on the Productivity and Profitability of Cotton. *American Journal of Experimental Agriculture*. 4(2): 130-141.
- Yang, C., G.N. Odvody, **C.J. Fernandez**, J.A. Landivar, R.R. Minzenmayer, R.L. Nichols, and J.A. Thomasson. 2014. Monitoring Cotton Root Rot Progression within a Growing Season Using Airborne Multispectral Imagery. *The Journal of Cotton Science* 18:85–93
- Yang, C., G.N. Odvody, **C.J. Fernandez**, J.A. Landivar, R.R. Minzenmayer, and R.L. Nichols. 2014. Evaluating unsupervised and supervised image classification methods for mapping cotton root rot. *Precision Agric* DOI 10.1007/s11119-014-9370-9
- Perea, H, J. Enciso, J. Jifon, S. Nelson, and **C.J. Fernandez**. 2013. On-farm performance of tensiometer and granular matrix soil moisture sensors in irrigated light, medium, and heavy soils. *Subtropical Plant Science* 65: 1-7.
- Fromme, D.D., W.J. Grichar, P.A. Dotray, and **C.J. Fernandez**. 2013. Grain sorghum tolerance and weed control with Pyrasulfotole plus Bromoxynil combinations. *Plant Management Network. Crop Management*: DOI 10.1094/CM-2013-0010-RS.
- Fromme, D.D., **C.J. Fernandez**, W.J. Grichar, and R.L. Jahn. 2012. Grain Sorghum response to hybrid, row spacing, and plant populations along the Upper Texas Gulf Coast. *International Journal of Agronomy*, vol. 2012, Article ID 930630, 5 pages, 2012. doi:10.1155/2012/930630
- Fromme, D.D., P.A. Dotray, W.J. Grichar, and **C.J. Fernandez**. 2012. Weed control and grain sorghum (*Sorghum bicolor*) tolerance to Pyrasulfotole plus Bromoxynil. *International Journal of Agronomy*, vol. 2012, Article ID 951454, 10 pages, 2012. doi:10.1155/2012/951454
- Fernandez, C.J.** D.D. Fromme, and W.J. Grichar. 2012. Grain sorghum response to row spacing and plant populations in the Texas Coastal Bend Region. *International Journal of Agronomy*, vol. 2012, Article ID 238634, 6 pages, 2012. doi:10.1155/2012/238634
- Ockerman, D.J. and **C.J. Fernandez**. 2010. Hydrologic conditions and water quality of rainfall and storm runoff for two agricultural areas of the Oso Creek watershed, Nueces County, Texas, 2005-08. *U.S. Geological Survey Scientific Investigations Report 2010-5136*, 63 p.
- Yang, C., J.H. Everitt, and **C.J. Fernandez**. 2010. Comparison of airborne multispectral and hyperspectral imagery for mapping cotton root rot. *Biosystems Engineering* 107:131-139.