CONTACT INFORMATION

Oklahoma State University	
Department of Plant and Soil Sciences	
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Research Interests

Agricultural systems modeling, integrated socioeconomic-biophysical systems modeling, climate change adaptation/mitigation, sustainable agriculture, international development

Education

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Ph.D., Agronomy (Crop Physiology and Ecology)	2013
University of Florida	
Dissertation: Improving soil fertility management in northern Ghana:	
an integrated modeling approach	
M.S., Interdisciplinary Ecology (Agronomy)	2008
University of Florida	
Thesis: Simulating the regrowth dynamics of 'Tifton 85' bermudagrass	
as affected by nitrogen fertilization	
B.A., Linguistics, Summa cum laude	2006
University of Florida	
Thesis: A semantic analysis and comparison of the verbs 'eat' in Akan and Dagaare	1
Minors: Plant Science & East Asian Languages and Literatures (Japan	nese)
ROFESSIONAL EXPERIENCE	
Oklahoma State University	
Assistant Professor, Plant and Soil Sciences	2015–present
International Maize and Wheat Improvement Center	1
Associate Scientist	2014 - 2015
Postdoctoral Fellow	2012-2014

PEER-REVIEWED PUBLICATIONS

- P.D. Alderman, K. J. Boote, J. W. Jones, and V. S. Bhatia. 2015. Adapting the CSM-CROPGRO model for pigeonpea using sequential parameter estimation. *Field Crops Res.* 181:1–15.
- S. Asseng, F. Ewert, P. Martre, R. P. Rötter, D. B. Lobell, D. Cammarano, B. A. Kimball, M. J. Ottman, G. W. Wall, J. W. White, M. P. Reynolds, P.D. Alderman, P. V. V. Prasad, P. K. Aggarwal, J. Anothai, B. Basso, C. Biernath, A. J. Challinor, G. De Sanctis, J. Doltra, E. Fereres, M. Garcia-Vila, S. Gayler, G. Hoogenboom, L. A. Hunt, R. C. Izaurralde, M. Jabloun, C. D. Jones, K. C. Kersebaum, A.-K. Koehler, C. Müller, S. N. Kumar, C. Nendel, G. O'Leary, J. E. Olesen, T. Palosuo, E. Priesack, E. E. Rezaei, A. C. Ruane, M. A. Semenov, I. Shcherbak, C. Stöckle, P. Stratonovitch, T. Streck, I. Supit, F. Tao, P. Thorburn, K. Waha, E. Wang, D. Wallach, J. Wolf, Z. Zhao, and Y. Zhu. 2014. Rising temperatures reduce global wheat production. *Nature Clim. Change*.
- M. A. S. Lara, C. G. S. Pedreira, K. J. Boote, B. C. Pedreira, L. Moreno, and P.D. Alderman. 2012. Predicting growth of *Panicum maximum*: An adaptation of the CROPGRO– perennial forage model. Agron. J. 104(3):600–611.
- **P.D. Alderman**, K. J. Boote, and L. E. Sollenberger. 2011. Regrowth dynamics of 'Tifton 85' bermudagrass as affected by nitrogen fertilization. *Crop Sci.* 51(4):1716–1726.
- **P.D. Alderman**, K. J. Boote, L. E. Sollenberger, and S. W. Coleman. 2011. Carbohydrate and nitrogen reserves relative to regrowth dynamics of 'Tifton 85' bermudagrass as affected by nitrogen fertilization. *Crop Sci.* 51(4):1727–1738.
- B. C. Pedreira, C. G. S. Pedreira, K. J. Boote, M. A. S. Lara, and P.D. Alderman. 2011. Adapting the CROPGRO perennial forage model to predict growth of *Brachiaria brizantha*. *Field Crops Res.* 120(3):370–379.

Submitted Manuscripts

- S. Acharya, M. Correll, J. W. Jones, K. J. Boote, **P.D. Alderman**, Z. Hu, and C. E. Vallejos. Submitted. Reliability of genotype-specific parameter estimates for a crop model. *Eur. J. Agron.*
- J. Crain, Y. Wei, J. Barker, III, S. Thompson, **P.D. Alderman**, M. Reynolds, N. Zhang, and J. Poland. Submitted. Phenocorn a small, field-based phenotyping platform. *Crop* Sci.
- M. A. Ramírez-Rodrigues, **P.D. Alderman**, L. Stefanova, C. M. Cossani, S. Asseng, and D. Flores. In revision. The value of seasonal forecasts for irrigated, supplementary irrigated, and rainfed wheat cropping systems in northwest Mexico. *Agric. Sys.*

OTHER PUBLICATIONS

- C. Stirling, J. Hellin, E. Silverblatt-Buser, T. Tefera, H. Ngugi, S. Gbegbelegbe, K. Tesfaye, U. Chung, K. Sonder, R. A. Cox, N. Verhulst, B. Govaerts, **P. Alderman**, and M. Reynolds. Shaping sustainable intensive production systems: Improved crops and cropping systems in the developing world. In J. Fuhrer and P. J. Gregory, editors, *Climate Change Impact and Adaptation in Agricultural Systems*, pages 186–203. CABI Climate Change Series: 5, Wallingford, UK, 2014.
- P.D. Alderman, E. Quilligan, S. Asseng, F. Ewert, and M. Reynolds, editors. Proceedings of the Workshop on Modeling Wheat Response to High Temperature; El Batan, Texcoco, Mexico; 19–21 Jun 2013, Mexico, DF, Mexico, June 2013. CIMMYT. http://repository.cimmyt.org/xmlui/handle/10883/3211.
- P.D. Alderman, J. Bost, N. Breuer, T. Gill, D. Graves, P. Hildebrand, E. Livengood, M. Mishkin, D. Ward, and D. Wilsey. Farming systems and farmer decision making in Columbia and Suwanee counties, 2007. Southeast Climate Consortium Technical Report Series: SECC-07-002. Gainesville, Florida.

INVITED PRESENTATIONS

- **P.D. Alderman**. Simulating the International Heat Stress Genotype Experiment, 2014. Symposium and Workshop on Modeling Wheat Under Changing Environment: Model Intercomparison and Improvement, June 24–26, 2014, Clermont-Ferrand, France.
- P.D. Alderman. Wheat modeling and physiological breeding for climate change, 2014. AgMIP-Pakistan Mid-term Workshop & International Seminar on Climate Change Adaptation Strategies to Ensure Food Security, January 16–17, 2014, Faisalabad, Pakistan.

Conference Presentations

- **P.D. Alderman**, C. M. Cossani, and M. P. Reynolds. Simulation modeling of genotype x environment interactions in wheat response to high temperature, 2013. American Society of Agronomy Meetings, November 3–6, 2013, Tampa, FL.
- **P.D. Alderman**, K. J. Boote, V. S. Bhatia, and J. W. Jones. Adapting the CROPGRO model to predict growth and yield of pigeonpea (Cajanus cajan), 2012. American Society of Agronomy Meetings, October 21–24, 2012, Cincinnati, OH.
- P.D. Alderman, K. J. Boote, and J. B. Naab. Effects of N and P fertilization and grain legume rotation on soil fertility and maize yield of smallholder farms in northern Ghana, 2011. American Society of Agronomy Meetings, October 16–19, 2011, San Antonio, TX.
- P.D. Alderman, K. J. Boote, and L. E. Sollenberger. Modeling the dynamics of photosynthesis and regrowth of Tifton 85 bermudagrass using CROPGRO-forage. Crop Science Society of America Meetings, October 5–9, 2008, Houston, TX.

P.D. Alderman, K. J. Boote, and L. E. Sollenberger. Regrowth and canopy assimilation dynamics of Tifton 85 bermudagrass as affected by nitrogen fertilization. Crop Science Society of America Meetings, November 4–8, 2007, New Orleans, LA.

Honors and Awards

American Society of Agronomy

Global Agronomy Graduate Student Poster Competition

 $\cdot~$ 1st place, 2011

Crop Science Society of America

Robert F. Barnes Graduate Student Oral Presentation Competition

- \cdot 3rd place, 2008
- · 2nd place, 2007

University of Florida, Gainesville, FL

Graduate School

 $\cdot~$ Alumni Graduate Award, 2008–2012

Agronomy Department

· Paul Robin Harris Memorial Scholarship Award, 2007,2008,2011

Center for African Studies

- $\cdot~$ Title VI Foreign Language and Area Studies Fellowship, 2006–2008
- $\cdot~$ Title VI Foreign Language and Area Studies Summer Fellowship, 2006

Research Experience

Wheat simulation model development

Evaluated and improved wheat modeling with international collaborators including:

- Developing innovative dynamic simulation modeling approaches for setting quantitative breeding targets for wheat (*Triticum aestivum* L.) under projected future climates
- Actively participating in wheat modeling activities of the Agricultural Model Intercomparison and Improvement Project (AgMIP)
- Configuring a Linux-based High-Performance Computing (HPC) cluster for conducting large-scale simulation modeling analysis
- Organizing a workshop on *Modeling Wheat Response to High Temperature* (in cooperation with AgMIP-Wheat) including participants from 18 institutions and 11 countries
- Collecting field-based phenological and growth analysis measurements of wheat under temperate and high-temperature conditions

Integrated modeling of soil fertility dynamics

Conducted research with researchers and farmers in Ghana, West Africa including:

- Modeling of long-term soil carbon and fertility dynamics using process-based crop and soil models within the Decision Support System for Agrotechnology Transfer Cropping Systems Model (DSSAT-CSM)
- Developing an agent-based dynamic household model in including a land use decision submodel based on mixed integer mathematical programming

2012–present

2008 - 2012

- Linking the dynamic household model to the lp_solve open-source mathematical programming solver via the C application programming interface
- Conducting integrated assessment of agricultural policy in northern Ghana using the dynamic household model linked with DSSAT-CSM crop and soil models

Dynamic modeling of perennial forage regrowth

Conducted field experiments and modeled the regrowth dynamics of Tifton 85 for age bermudagrass ($Cynodon\ spp.$) including:

- Canopy and leaf carbon exchange measurements with LI-COR 6200
- Growth analysis of bermudagrass involving taking and processing sod cores
- Determination of plant N and carbohydrate concentrations using near-infrared spectroscopy, laboratory analysis, and principal components regression
- Adapting a process-based crop model (DSSAT-CROPGRO) to simulate perennial forage grass regrowth dynamics

TEACHING & ADVISING

$PhD\ Student\ Advisement$

Supervised two PhD students researching ground-penetrating radar for quantitative wheat root phenotyping and proximal sensing to characterize wheat growth and development at a breeding-scale.

PhD Student Internship

Supervised a PhD student researching benefits of seasonal climate forecasting for wheat production in northwest Mexico using cropping systems simulation and economic analysis.

Alternative Cropping Systems – Course Revision

Redesigned a course on alternative cropping systems based on an active learning framework as a project for a seminar on principles of professional instruction.

Plants that feed the world – Teaching Assistant

Introduction to 25 of humankind's most important food crop plants with emphasis on soil and climatic adaptations, major producers and consumers, nutritional attributes, processing needs and types of products.

Principles of Crop Science – Teaching Assistant

An overview of plant evolution, anatomy, physiology, improvement, pest, water, and nutrient management as applied to a variety of plant production systems.

POGIL Workshop

Participant in training workshop on the experiential learning cycle and techniques for developing course materials within an active learning framework called Process Oriented Guided Inquiry Learning (POGIL).

Forage Science and Range Management – Teaching Assistant 2011

Scientific and technological developments in the selection, production and utilization of forage crops, and in the development and management of grazing areas.

2013-2014

2006-2008

2013

2011

2011

2011

2011

Facilitation Skills for Adaptive Management

Participant in course on facilitation, learning, group and communication skills for supporting collaborative approaches to research, conservation and development.

OTHER RELEVANT EXPERIENCE

DSSAT-CSM Core Development Team

- Core developer for the perennial forage model
- Contributor to CROPGRO, CENTURY-SOM, CERES-wheat and CROPSIM-wheat
- Modified code to improve computational performance and cross-platform portability
- Developed a comprehensive interface to the DSSAT-CSM as an R package (dssatR).

Parameter Estimation Algorithm

Developed a parameter estimation program for DSSAT-CSM based on the Metropolis-Hastings algorithm (a Markov Chain Monte Carlo Bayesian method) currently in use for NSF-funded research on common bean (*Phaseolus vulgaris* L.) at the University of Florida.

Next Generation Farming Systems Models Workshop

Expert consultant for an invitation-only workshop convened by the Bill & Melinda Gates Foundation. The theme of the workshop was redesigning agricultural systems models to address the complex questions facing the agricultural sector over the next 35 years.

GRANT-WRITING EXPERIENCE

Heat and Drought Wheat Improvement Consortium

Drafted (with collaborators) two concept notes combining field experimentation with dynamic crop simulation modeling to support the formation of a new international wheat improvement initiative: the Heat and Drought Wheat Improvement Consortium (HeDWIC). Both were selected for presentation to funders and other stakeholders.

Climate Change, Agriculture and Food Security

Contributed the simulation modeling components of two research proposals recently funded by the CGIAR Research Program on Climate Change, Agriculture and Food Security

Computer Software & Programming Languages

- Bash shell script (Linux)
- C/C++
- FORTRAN
- Git version control
- HTCondor (HPC batch management system)
- LATEX(high-quality typesetting system)
- MATLAB/Octave
- R (open-source statistical programming language)

2010-present

2011-present

2014

2014 1 dv-

2014

2009

Service Experience

Discussion Leader 2015

Led discussion session related to sustainable agricultural systems at the landscape/agroecological scale at the annual meeting of the Agricultural Model Intercomparison and Improvement Project

Graduate Student Competition Judge

2014

Judged Graduate Student Oral Competition for the C02 Crop Physiology and Metabolism Division of the Crop Science Society of America

University of Florida Graduate Student Council Representative 2009-2011

- Represented Agronomy Department at regular Council meetings
- Represented graduate student interests at department faculty meetings

Professional Memberships

- American Society of Agronomy (2005-present)
- Crop Science Society of America (2005-present)