

## CIRRICULUM VITAE

# NATHAN PIERCE

Ph.D. Candidate

University of Arizona, School of Natural Resources and the Environment

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## EDUCATION

- Ph.D., Natural Resources**                      **University of Arizona, 2018 (expected)**  
*Dissertation title: Plant-plant interactions during grassland-to-shrubland transitions in arid rangelands.*  
*Co-advisors: Dr. Steve Archer (UA), Dr. Brandon Bestelmeyer (USDA/ARS – Jornada Experimental Range)*
- Certificate in College Teaching**                      **University of Arizona, Office of Instruction & Assessment, 2014**
- M.Sc., Horticulture**                                      **Cornell University, 2002**  
*Thesis title: Photosynthetic and Nitrogen use efficiency of indeterminate and determinate Phaseolus beans in response to carbon dioxide and nitrogen supply.*  
*Advisor: Dr. David Wolfe*
- B.Sc., Biology**    **University of Evansville, 1998**  
(One semester at Harlaxton College, Grantham, England)

## RESEARCH EXPERIENCE

- **Graduate Research Assistant** – University of Arizona, School of Natural Resources and the Environment. 2009-Present.
  - Dissertation research investigates grass-shrub and shrub-shrub interactions along a continuous grassland-to-shrubland state transition at the Jornada Experimental Range/Jornada Basin LTER in southwest New Mexico, USA. I approached this with a suite of complementary selective removal experiments that manipulated the configuration of the plant neighborhood surrounding target grass patches or shrub individuals, and monitored ANPP and other metrics of plant performance over multiple growing seasons. Methods of data analysis include traditional null hypothesis testing and information-theoretic approaches. I also contributed to projects exploring the influence of precipitation legacies on aboveground ANPP, and how aeolian transport of sediment and nutrients following grass removal affects grassland-shrubland threshold dynamics.
- **Research Specialist** – University of Arizona, Department of Ecology & Evolutionary Biology and School of Natural Resources and the Environment (concurrent positions). 2005-2009.
  - **EEB:** Management of a large-scale, field-based study investigating influence of precipitation variability on interactions between native and non-native grasses and woody plant seedling establishment. Responsibilities included management/coordination of a small army of graduate students and undergraduate research assistants; calibration, maintenance and upkeep of technical equipment, research supplies, and field site infrastructure; and data management/organization. I also contributed to research projects on ecosystem-scale carbon and water flux, population

- ecology of Sonoran Desert winter annuals, and temperature sensitivity of drought-induced tree mortality. Supervisor: Dr. Travis Huxman.
- **SNRE**: Assisted in the design, establishment, and implementation of field and greenhouse studies comparing seedling responses to water pulses in woody plant species with contrasting encroachment histories in semiarid grasslands. Supervisor: Dr. Steve Archer.
  - **Research Support Specialist** – Cornell University Department of Horticulture. 2002.
    - Establishment and management of field and greenhouse experiments exploring the effect of mycorrhizal fungi inoculation and root chilling on yield, nitrogen use efficiency, and gene expression in sweet corn. Supervisors: Dr. David Wolfe, Dr. Tim Setter.
  - **Graduate Research Assistant** – Cornell University Department of Horticulture. 1999-2002.
    - Thesis research focused on how elevated atmospheric CO<sub>2</sub> influenced yield, photosynthetic rates, and biomass, C and N allocation in green bean cultivars with differing life histories (determinate vs. indeterminate) and N source (mineral fertilizer vs. biological nitrogen fixation).
  - **Research Technician/Plant Taxonomist** – Natural Resources Ecology Laboratory, Colorado State University. 1998-1999.
    - Contributed to a survey of plant species diversity, cryptobiotic soil crust variability, and soil heterogeneity in the Grand Staircase–Escalante National Monument in southern Utah, USA. Supervisor: Dr. Tom Stohlgren.

### TEACHING EXPERIENCE

- **Introductory Ecology & Evolutionary Biology Lab**, ECOL 182L (Instructor), University of Arizona, Department of Ecology & Evolutionary Biology. Spring 2013-2015, 2017; Fall 2014, 2016.
- **Field Botany Laboratory**, RNR 230L (Instructor), University of Arizona, School of Natural Resources and the Environment, Fall 2012-2014.
- **Plant-Plant Interactions**, HORT 494 (Teaching Assistant), Cornell University, Department of Horticulture, Spring 2001.
- **Mineral Nutrition of Crop and Landscape Plants**, HORT 460 (Teaching Assistant), Cornell University Department of Horticulture, Spring 2000.
- **Vegetable Crops Production**, HORT 219 (Lab Instructor), Cornell University, Department of Horticulture, Fall 1999-2000.

### GRANTS & AWARDS

- Ecological Society of America Rangeland Section Excellence in Rangeland Research Award, August 2016.
- Harry Wayne Springfield Endowment Scholarship to Support Students in Plant Ecology, University of Arizona, School of Natural Resources & Environment, Summer 2016.
- University of Arizona Graduate and Professional Student Council Travel Grant Award, July 2015.
- Harry Wayne Springfield Endowment Scholarship to Support Students in Plant Ecology, University of Arizona, School of Natural Resources & Environment, Summer 2015.
- NSF/LTER Graduate Research Fellowship, Summer 2013 and 2014.
- University of Arizona K-12 Science Education and Outreach Fellowship, 2012-2013 academic year.
- Science Foundation Arizona K-12 Science Education and Outreach Fellowship, University of Arizona, 2011-2012 academic year.
- Earth Fellowship award, University of Arizona Institute for Environment and Society, Global Change Interdisciplinary PhD minor program, 2009-2010.
- Science Foundation Arizona Fellowship, University of Arizona, 2010.
- Outstanding Teaching Assistant, Cornell University College of Agriculture and Life Sciences, Fall 2000.

- Biogeochemistry and Environmental Biocomplexity IGERT Small Grants award, Cornell University, Fall 2001. Proposal title: Carbon and nitrogen cycling in agroecosystems.

### **PUBLICATIONS**

- Pierce NA, Archer SR, Bestelmeyer BT, James DK (2018). Grass-shrub competition in arid lands: an overlooked driver of grassland-shrubland state transition? *Ecosystems*, *In Press*.
- Pierce NA (2002). *Photosynthesis and nitrogen use efficiency of indeterminate and determinate Phaseolus beans in response to carbon dioxide and nitrogen supply*. MS Thesis.

### **ORAL PRESENTATIONS**

- Pierce N, Archer S, Bestelmeyer B (2016). Grassland-shrubland state transitions in arid lands: competition matters. Ecological Society of America Annual Meeting, Ft. Lauderdale, FL. August 9.
- Pierce N, Archer S, Bestelmeyer B (2015). Location, location, location: the influence of plant neighborhood configuration on grass-shrub interactions. Ecological Society of America 100<sup>th</sup> Annual Meeting, Baltimore, MD. August 11.
- Pierce N (2014). Location, location, location: the influence of plant neighborhood configuration on grass-shrub interactions. Jornada LTER Desert Ecology Workshop, Las Cruces, NM. July 8.
- Pierce N (2002). Source-sink interactions of green beans grown at elevated CO<sub>2</sub>: photosynthesis, resource partitioning, and nitrogen fixation. Cornell University Department of Horticulture Seminar Series.

### **POSTER PRESENTATIONS**

- Pierce N, Archer SR, Bestelmeyer B (2015). Shrub dynamics in pre- and post-encroachment phases of grassland-to-shrubland transition. Research Insights in Semiarid Ecosystems (RISE) Symposium, Tucson, AZ. October 17.
- Pierce N, Archer SR, Bestelmeyer B (2015). Do grass-shrub interactions influence grassland-to-shrubland state transition? NSF Long-Term Ecological Research Network All-Scientists Meeting, Estes Park, CO. September 1.
- Pierce N, Archer SR, Bestelmeyer B (2012). Grass-shrub interactions in a Chihuahuan Desert ecosystem: can vegetation structure predict state change? LTER All Scientists Meeting, Estes Park, CO. September 15.
- Archer SR, Pierce N, Lamanna CL (2010). Lateral roots and lignotubers: overlooked components of ecosystem carbon pools in drylands? Ecological Society of America Annual Meeting, Pittsburgh, PA. August 3.
- Resco V, Sun W, Pierce N, Huxman TE, Weltzin JF, Williams DG (2007). Stomatal and non-stomatal limitations to carbon assimilation in response to rainfall pulses in woody plant seedlings. Ecological Society of America Annual Meeting, 2007.

### **OTHER PROFESSIONAL ACTIVITIES AND ASSOCIATIONS**

- Reviewer, Native Plants Journal
- Grant Application Judge, University of Arizona Graduate and Professional Student Council Travel Grants Program
- Member, Ecological Society of America
- Member, Society for Range Management

### **TECHNICAL/INSTRUMENTATION KNOWLEDGE AND EXPERIENCE**

- Plant Ecophysiology and Growth Analysis
  - LiCor LI-6400 Portable Gas Exchange System
  - PP Systems CIRAS-1 Portable Photosynthesis Analysis System
  - Decagon Leaf Porometer
  - Decagon WP-4 Dewpoint Potentiometer
  - PMS Instruments Model 600 Pressure Chamber
  - Hansatech FMS-2 Pulse-Modulated Chlorophyll Fluorescence Monitoring System
  - Opti-Sciences OS1-FL Pulse-Modulated Chlorophyll Fluorescence Monitoring System
  - Carbon/Nitrogen analysis of plant tissues, combustion method
  - LiCor LI-3100C Leaf Area Meter
  - Dyanmax DEX Band Dendrometer
  - Hydropneumatic Elutriation Root Washer
  
- Plant Biochemistry
  - Rubisco analysis – activity and concentration
  - Leaf chlorophyll content
  - Nitrogen Fixation analysis by xylem sap ureide concentration and by nitrogenase activity (via acetylene reduction assay)
  
- Soil and Soil Biology
  - LiCor LI-820 CO<sub>2</sub> gas analyzer (soil respiration measurements)
  - Campbell Scientific TDR 100 Time Domain Reflectometer
  - Campbell Scientific HydroSense soil moisture monitoring system
  - Decagon ECH2O EC-10 and EC-5 soil moisture sensors
  - Aqua-Pro AP soil moisture monitoring system
  - Soil texture analysis: Bouyoucos hydrometer method
  - Potentially Mineralizable Nitrogen: aerobic/anaerobic and distillation processes
  - Carbon/Nitrogen analysis: combustion method
  - Soil Microbial Biomass assay by chloroform fumigation/extraction
  
- Environmental Monitoring
  - LiCor LI-7500 Open-path CO<sub>2</sub>/H<sub>2</sub>O Gas Analyzer
  - Onset HOBO Standalone weather stations equipped with: air temperature/RH, precipitation, PAR, wind speed/direction, soil temperature and moisture, barometric pressure
  
- Data Logging Equipment and Systems
  - Campbell Scientific dataloggers: CR10, CR10X