

# Alencar Xavier

## Plant Breeding and Statistical Genetics

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**E-mail:** alenxav@gmail.com  
**Phone:** 765-631-2572

**Website:** <http://alenxav.wix.com/home>  
**GitHub:** <https://github.com/alenxav/>

**ORCID:** [orcid.org/0000-0001-5034-9954](https://orcid.org/0000-0001-5034-9954)

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I am a research scientist with expertise in agronomy, plant breeding, statistical genetics, machine learning, phenomics and genomics. I work with the design, execution, and analysis of experimental and observational studies. I have four years of industry experience as quantitative geneticist complemented by adjunct faculty position at Purdue University. I like working in collaborative environments that encourage teamwork, and I value accountability and transparency with stakeholders.

## EXPERIENCE

- 2016 - Current: **Research Scientist**, Biostatistics group at Corteva Agrisciences.
- 2017 - Current: **Adjunct Faculty**, Department of Agronomy, Purdue University.
- 2013 - 2016: **RA Population Genetics**, Purdue University. Supv. by William Muir ([bmuir@purdue.edu](mailto:bmuir@purdue.edu)).
- 2013 - 2016: **RA Soybean Breeding**, Purdue University. Supv. by Katy Rainey ([krailey@purdue.edu](mailto:krailey@purdue.edu)).
- 2010 - 2011: **RA Potato Breeding**, UFSM, Brazil. Supv. by Dilson Bisognin ([dilsonb@smail.ufsm.br](mailto:dilsonb@smail.ufsm.br)).
- 2009 - 2011: **RA Soil Physics**, UFSM, Brazil. Supv. by Jose Miguel Reichert ([reichert.jm@gmail.com](mailto:reichert.jm@gmail.com)).

## ACADEMICS

### 1. Academic Background

- *Technical degree in agriculture and livestock* (2004-2006). E.E.T. Celeste Gobbato, RS, Brazil.
- *B.Sc. Agronomic Engineering* (2007-2011). Federal University of Santa Maria, RS, Brazil.
- *Ph.D. Soybean Breeding and Statistical Genetics* (2013-2016). Purdue University, IN, USA. *GPA 4.*

### 2. Awards and Recognitions

- *Summer Institute of Statistical Genetics (SISG) Scholarship*, University of Washington. 2016.
- *John Axtell Graduate Student Award in Plant Breeding and Genetics*, Purdue University. 2016.
- *ICQG5 Fellowship*. Support for graduate students in plant breeding. Sponsored by USDA. 2016.
- *Dow AgroSciences Graduate Scholarship*. Integrity, academic excellence, initiative and leadership, 2016.
- *Outstanding Graduate Research Award (PhD)*. Purdue 2015 Graduate Student Award.
- *Summer Institute in Statistics for Big Data (SISBID) Scholarship*, University of Washington. 2015.
- *AG Spotlight - Graduate AG Research Spotlight*. College of Agriculture, Purdue University. Feb 2015.
- *Bauman-Doolittle Endowment* - Support for graduate students in breeding and genetics. 2015.
- *Loyal F. Pete Bauman Memorial Fund* - Support for graduate students in breeding and genetics. 2014.
- *Wyman E. Nyquist Scholarship* - Quantitative Genetics. Purdue 2014 Graduate Student Award.
- *Soy2014 Student Award* - MCBS: 15th Biennial Conference. University of Minnesota, 2014.
- *Summer Institute of Statistical Genetics (SISG) Scholarship*, University of Washington. 2013.

### 3. Areas of Expertise

- Plant genetics and breeding, field breeding techniques and selection theory;
- Phenomics and high-throughput technologies in plant breeding;
- Mixed models, multivariate models, machine learning and Bayesian methods;
- Spatial statistics, adjustment of field variation and imputation methods;
- QTL mapping, Genome-wide association mapping, genome-wide prediction methods;
- Computational breeding, algorithm development and high-performance computing;

### 4. Editor

- *Scientia Agricola* (2019)

### 5. Reviewer

- *African Journal of Agricultural Research* (2016), *BMC Genomics* (2016), *Crop Science* (2016), *Euphytica* (2018), *Evolutionary Bioinformatics* (2018), *Field Crop Research* (2018), *Genes* (2019), *Genetics* (2016), *G3* (2016), *Heredity* (2019), *iMedPub* (2016), *International Journal of Molecular Sciences* (2019), *Journal of Animal Breeding and Genetics* (2018), *Plants* (2019), *PLOS Computational Biology* (2018), *The Crop Journal* (2018), *Theoretical and Applied Genetics* (2019).

### 6. Patents

- Rainey, et al. (2018). Method of using genetic architecture of phenomic-enabled canopy coverage in glycine max. [LINK](#)
- 7. Grants**
    - Rainey, et al. (2020). Application of UAS biomass longitudinal phenotypes to selection in soybean breeding trials. National Institute of Food and Agriculture, USDA.
  - 8. Complementary Background**
    - Mixed Models in Quantitative Genetics (2013). *SISG*. University of Washington.
    - Markov chain Monte Carlo applied to Genetic Analysis (2013). *SISG*. University of Washington.
    - Supervised Methods for Statistical Machine Learning (2015). *SISG*. University of Washington.
    - Unsupervised Methods for Statistical Machine Learning (2015). *SISG*. University of Washington.
    - Population Genetic Data Analysis (2016). *SISG*. University of Washington.
    - Association Mapping: GWAS and Sequencing Data (2016). *SISG*. University of Washington.
  - 9. Computational**
    - Advanced R programming and related tools (Markdown, Shiny, Rcpp).
    - Background on C++, parallel computing, commercial analytical libraries (Eigen, SAS, ASReml, BLUPF90).
    - Familiarity with machine learning computation and libraries (AWS, Docker, Keras, h2o, XGBoost).
    - Basic coding in Python, Shell, SQL, Perl/regex and LaTeX.

## PUBLICATIONS

- 1. Software**
  - Xavier, A. et al. (2015). NAM: Nested Association Mapping. [LINK](#)
  - Xavier, A. et al. (2015). SoyNAM Dataset. [LINK](#)
  - Xavier, A. et al. (2015). bWGR: Bayesian Whole-Genome Regression. [LINK](#)
- 2. Presentations & Short Courses**
  - ANSC595, Quantitative Genomics Applied to Breeding (1 lecture), Purdue University, Fall 2019. [LINK](#)
  - Xavier, A. Good learners, faster learning. *IMPG3*, University of Sao Paulo, 2019. [LINK](#)
  - Xavier, A., Brito, L., Rainey, KM. Mixed models applied to breeding. *Purdue*, 2019. [LINK](#)
  - Xavier, A. Good learners, faster learning. *PAG*, 2019. [LINK](#)
  - Xavier, A. and Morota, G. Short course in mixed models. *UFV*, 2018. [LINK](#)
  - Xavier, A. Learning from Data: Machine Learning in Plant Breeding. *UFV*, 2018.
  - AGRY611, Quantitative Genetics (7 lectures), Purdue University, Fall 2017. [LINK](#)
  - AGRY620, Advanced Plant Breeding (3 lectures), Purdue University, Spring 2017.
  - Xavier, A. Analytical Methods for Phenomics. *Purdue Phenomic Workshop*, 2017. [LINK](#)
  - Xavier, A. Learning from Data: Machine Learning in Plant Breeding. *UNL*, 2016.
  - Xavier, A. Learning from Data: Machine Learning in Plant Breeding. *Cornell*, 2016.
  - Xavier, A. Learning from Data: GxE analysis on multiple population. *SBW*, 2016.
  - Xavier, A. Learning from Data. *Purdue*. [LINK](#). 2015.
  - Rainey, KM and Xavier, A. Learning from Data: A SoyNAM Study. *SBW*, 2014.
- 3. Selected articles**
  - Mohammadi, Xavier, et al. (2020). Deployment of QTLs from GWAS in plants. *Current Plant Biology*. [LINK](#)
  - Hall, Xavier, et al. (2020). Quantitative characterization of proximate sensing canopy traits. *Crop Sciences*. [LINK](#)
  - Xavier and Rainey (2020). Quantitative Genomic Dissection of Soybean Yield Components. *G3*. [LINK](#)
  - Gangurde et al. (2020). NAM uncovers candidate genes for seed and pod weights in peanut. *Plant Biotech J*. [LINK](#)
  - Xavier et al (2019). bWGR: Bayesian Whole-Genome Regression. *Bioinformatics*. [LINK](#)
  - Xavier (2019). Efficient Estimation of Marker Effects in Plant Breeding. *G3*. [LINK](#)
  - Lopez et al (2019). Genetic architecture of photosynthesis and water use efficiency in Soybean. *Frontiers*. [LINK](#)
  - Diers et al (2018). Genetic architecture of soybean yield and agronomic traits. *G3*. [LINK](#)
  - Xavier et al (2018). Genomic properties of the USDA soybean germplasm collection. *Plant Genetic Resources*. [LINK](#)
  - Jarquin et al (2018). Modeling Interactions between environments, genotype and soybeans canopy. *Agronomy*. [LINK](#)
  - Xavier et al (2018). Genome-Wide Analysis of Grain Yield Stability in Soybeans. *G3*. [LINK](#)
  - Xavier et al (2017). Genetic Architecture of Phenomic-enabled Canopy Coverage in *Glycine max*. *Genetics*. [LINK](#)
  - Xavier et al (2017). Genomic Prediction using Subsampling. *BMC Bioinformatics*. [LINK](#).
  - Xavier et al (2017). Unsupervised learning techniques to dissect associations of soybean traits. *Euphytica*. [LINK](#).
  - Xavier et al (2016). Walking through the Black Boxes of Statistical Plant Breeding. *TAG*. [LINK](#).
  - Xavier et al (2016). Assessment of Predictive Properties of Genome-wide Selection in Soybeans. *G3*. [LINK](#).
  - Xavier et al (2016). Genetic variation captured by a SNP panel in soybean. *BMC Informatics*. [LINK](#)
  - Xavier (2016). Learning from data: Plant breeding applications of machine learning. *Purdue University*. [LINK](#)
  - Xavier et al (2015). Association Studies in Multiple Populations. *Bioinformatics*. [LINK](#).