

Alencar Xavier

Plant Breeding and Statistical Genetics

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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).
- 2013 - 2016: **RA Soybean Breeding**, Purdue University. Supv. by Katy Rainey (krainey@purdue.edu).
- 2010 - 2011: **RA Potato Breeding**, UFSM, Brazil. Supv. by Dilson Bisognin (dilsonb@smail.ufsm.br).
- 2009 - 2011: **RA Soil Physics**, UFSM, Brazil. Supv. by Jose Miguel Reichert (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. 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.

3. 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.

4. Key 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;

5. Editor

- Scientia Agricola (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. Awards and Recognitions

- *Best Early-Mid Career Researcher Poster Slide*. International Conference of Quantitative Genetics 6. 2020.
- *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.

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

- Xavier, A. Overview on Plant Breeding Analytics (lecture), Purdue University, 2021. [LINK](#)
- Xavier, A. Implementation and validation of supervised methods for genomic prediction, ASA-CSSA-SSSA Meeting, 2021. [LINK](#)
- Xavier, A. Efficient Estimation of Polygenic Effects via Multivariate Ridge Regression, ASA-CSSA-SSSA Meeting, 2021. [LINK](#)
- Xavier, A. Technical Nuances of Machine Learning in Plant Breeding, Iowa State Symposium, 2021. VIDEO, SLIDES.
- 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

- Silva et al. (2021) Breeding Strategy on the Long-Term Genetic Gain in Soybean Breeding [LINK](#)
- Xavier et al. (2021) Modeling of Genetics and Field Variation in Breeding Trials [LINK](#)
- Xavier (2021) Implementation and validation of supervised methods for genomic prediction in plant breeding. [LINK](#)
- Jarquin et al. (2020) Predicting yield from canopy imagery. Intelligent Image Analysis for Plant Phenotyping. [LINK](#)
- 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](#).