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-Current)
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. Implementation and Validation of supervised methods in GS, 2021 ASA CSSA SSSA meetings. LINK
   - Xavier, A. Efficient computation of multivariate ridge regression, 2021 ASA CSSA SSSA meetings. LINK
   - Xavier, A. Technical Nuances of Machine Learning. Iowa State University, 2021. LINK
   - Xavier, A. Overview on Plant Breeding Analytics (lecture), Purdue University, 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.