Matheus D. Krause

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I am a motivated Ph.D. Candidate in Plant Breeding with a Statistics minor at Iowa State University. My field of expertise and research interest include quantitative and statistical genetics, biometry, and biostatistics. I have extensive experience in R programming and contributed to many collaborative projects focused on data analysis. In addition, during my academic career, I had hands-on experience in daily breeding operations in different countries. My expected graduation date is the Spring of 2023.

EDUCATION

Ph.D. Candidate in Plant Breeding with Statistics minor (2023)
Iowa State University - Ames, Iowa, USA | Major Professor: Dr. William D. Beavis
Title: Untangling genetic and non-genetic factors for soybean breeding optimization.

Master's Degree in Plant Breeding and Genetics (2018)
University of São Paulo - Piracicaba, SP, Brazil | Major Professor: Dr. Antonio A. F. Garcia
Title: Boosting predictive ability of maize hybrids via genotype by environment interaction under multivariate GBLUP models.

Bachelor's Degree in Agronomy (2015)
Londrina State University - Londrina, PR, Brazil | Major Professor: Dr. Josué M. Ferreira
Title: Combining ability of maize inbred lines S_9 derived from ST15 and S709 synthetics.

Exchange Student in Plant Breeding & Engineering for Mediterranean and Tropical Areas (2014)
SupAgro - Montpellier, France | Supervisors: Drs. Ricardo Ralisch and Jean-Luc Regnard
Title: Productibilité semencière de nouveaux géniteurs maïs : faisabilité de l'utilisation de données de production.

RESEARCH EXPERIENCE

Graduate Research Assistant | 2018 - Present, Department of Agronomy, Iowa State University
- Development of a metric to estimate realized rate of genetic gain on an annual basis using soybean routine field trials.
- Unraveling genotype by environment variation to identify mega-environments with genetic and non-genetic factors.
- Development of software to correct partially informative markers from backcross one derived double-haploid lines.
- Genome-wide association for complex binary (case-control) and continuous traits.
- Mentored several graduate students (20+) with plant breeding data analysis and R programming.

Graduate Research Assistant | 2016 - 2017, Department of Genetics, University of São Paulo
- Applying multivariate linear mixed models to predict yield performance of single-cross maize hybrids based on information from genomics and genotype by environment interaction.

Intern | 2015, Tropical Breeding & Genetics, Soybean Breeding
- Plant phenotyping for soybean cyst nematode, *Phytophthora sojae* and *Sclerotinia sclerotiorum*, generation advancement in greenhouses, crossing blocks, seed packing, and general activities in the biotechnology laboratory.

Undergraduate Research Assistant | 2010 - 2015, Department of Biology, Londrina State University
- Development and evaluation of inbred lines for common and sweet corn via classical and double-haploid techniques.
- Evaluation and development of single-cross hybrids and synthetic populations for both common and sweet corn.
- Participation in an extension project to teach farmers how to produce their seeds of synthetic populations.

Intern | 2014, Limagrain Europe, Department of Seed Production to Research
- Data mining to support early decision-making on the profitability of female maize inbred lines (seed production).
- Stability analysis to identify stable check cultivars to be used in seed production.

SELECTED JOURNAL PUBLICATIONS

Krause, MD; Dias, KOG; Singh, AK; Beavis, WD. Using soybean historical field trial data to study genotype by environment variation and identify mega-environments with the integration of genetic and non-genetic factors. Submitted to Field Crops Research, 2022. DOI: 10.1101/2022.04.11.487885.

Dias, KOG; dos Santos, JPR; **Krause, MD**; Piepho, HP; Guimarães, LJM; Pastina, MM; Garcia, AAF. Leveraging probability concepts for cultivar recommendation in multi-environment trials. Theoretical and Applied Genetics, 2022. DOI: 10.1007/s00122-022-04041-y.

Montes, CR; Fox, C; Sanz-Sáez, A; Serbin, SP; Kumagai, E; **Krause, MD**; Xavier, A; Specht, J; Beavis, WD; Bernacchi, CJ; Diers, BW; Ainsworth, EA. High-throughput characterization, correlation, and mapping of leaf photosynthetic and functional traits in the soybean (*Glycine max*) nested association mapping population. Genetics, 2022. DOI: 10.1093/genetics/iyac065.

Verzegnazzi, AL; Santos, I; **Krause, MD**; Hufford, M; Frei, UK; Campbell, J; Almeida, VC; Zuffo, LT; Boerman, N; Lübberstedt, T. Major locus for spontaneous haploid genome doubling detected by a case–control GWAS in exotic maize germplasm. Theoretical and Applied Genetics, 2021. DOI: 10.1002/csc2.20253.

Krause, MD; Dias, KOG; dos Santos, JPR; Oliveira, AAO; Guimarães, LJM; Pastina, MM; Margarido, GRA; Garcia, AAF. Boosting predictive ability of tropical maize hybrids via genotype by environment interaction under multivariate GBLUP models. Crop Science, 2020. DOI: 10.1002/csc2.20253.

SKILL SET

Specific skills

- Data science: Linear and generalized mixed models, bayesian inference, stochastic simulations, probability theory. Data mining, curation, and acquisition for statistical inference. Cloud / high performance computing.
- Plant breeding: Genomic prediction, QTL mapping, GWAS, GxE analysis, experimental designs.
- I am a constant learner eager to collaborate across diverse groups.

Programming Experience

- Advanced R programming language, basic Python and Julia, Linux, and LaTeX.
- Developer of the R package SoyURT.

Leadership

- **2020-2021** Committee member in the 7th and 8th annual R. F. Baker Plant Breeding Symposium at Iowa State University.
- **2011-2013** Student representative of Agronomy in the Regional Council of Engineering and Agronomy in Brazil.

Language

English, Portuguese (native), basic French.

TEACHING, SEMINAR & AWARDS

Teaching & Seminar

- **2023** Talk on "From PDF Files to Biological Insights into Soybean Breeding: An Example of How Recovered Historical Yield Data Can be Valuable", in the "Big data: manage your data before your data kills you" workshop at the Plant & Animal Genome Conference, in San Diego, California - USA.
- **2020 and 2022** Lecture on "Simulations in Plant Breeding - An emphasis on *AlphaSimR*" in Agron 523, Molecular Plant Breeding, graduate-level course under Dr. Thomas Lübberstedt at Iowa State University.
- **2017** Instructor of R programming at the University of São Paulo.

Awards

- **2022** C. R. Weber for Excellence in Plant Breeding from the Department of Agronomy at Iowa State University.
- **2020 and 2022** Bayer Travel Scholarship & Mentoring Program for Graduate Students and Postdoctoral Researchers.

ADDITIONAL INFORMATION

Matheus enjoys...

Spending time with his family and friends • Reading • Fishing • Being outdoors • Playing guitar • Riding motorcycle.

For more information, please access