RICARDO GOMES TOMÁZ

PLANT DISEASE EPIDEMIOLOGIST | PREDICTIVE RISK MODELING | YIELD-LOSS ANALYTICS | QUANTITATIVE PHENOTYPING
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PROFESSIONAL SUMMARY

Plant disease epidemiologist and quantitative scientist with research experience in Brazil and the United States, focused on anticipating plant health threats and quantifying their impacts on crop productivity and economic performance. Integrates multi-location field trials with weather, disease, agronomic, yield, and economic data to develop predictive risk models, simulation frameworks, and interactive decision-support tools. Research across soybean, maize, rice, and wheat addresses disease-risk prediction and forecasting-oriented modeling, yield-loss and profitability analysis, management efficacy, germplasm response, and quantitative phenotyping. Develops reproducible R/Python tools and translates complex analytical results into actionable insights for crop protection and breeding.

CORE EXPERTISE

Plant health risk assessment and forecasting: Predictive epidemiology | Weather–disease relationships | Exposure–lag–response modeling | Disease-risk prediction and forecasting-oriented modeling | Environmental risk and scenario analysis.

Yield and economic impact: Yield-loss modeling | Damage functions | Fungicide efficacy and profitability analysis | Scenario simulation | Uncertainty propagation.

Integrated plant health analytics: Multi-location and multi-season field trials | Environmental, epidemiological, agronomic, yield, economic, and imaging data integration | Germplasm response assessment | Crop protection and breeding applications.

Statistical methods: Frequentist and Bayesian modeling | Mixed-effects models | Meta-analysis | Ensemble prediction | Model validation.

AI, phenotyping and software: Machine learning | Artificial intelligence (computer vision) | YOLO detection and classification | Quantitative disease phenotyping | R and Python | GitHub | Interactive decision-support tools.

RELEVANT RESEARCH EXPERIENCE

Visiting Doctoral Researcher - Computational Agronomy and Crop Protection **2025-Present**
Louisiana State University (LSU) | *Louisiana, USA*

- Develop high-throughput computer-vision workflows for rice kernel smut phenotyping, using YOLO-based detection and classification to support germplasm screening in rice breeding programs.
- Apply epidemiological modeling and field-trial data analysis to rice disease research, integrating environmental and agronomic information with disease and yield observations.
- Develop damage-function and simulation approaches to quantify yield and economic losses from rice sheath blight across contrasting genotype responses, supporting disease-management and breeding-related decisions.

Doctoral Research - Plant Disease Epidemiology and Data Analysis **2023-Present**
Universidade Federal de Viçosa (UFV) | *Viçosa, Minas Gerais, Brazil*

- Develop weather-driven risk models for soybean target spot, including distributed lag nonlinear models to estimate delayed and nonlinear associations between environmental conditions and disease severity.
- Analyze multi-location field-trial data across Brazilian states and growing seasons to assess weather–disease relationships and climatic favorability for soybean target spot.
- Quantify disease-yield relationships, cultivar tolerance, yield protection, fungicide profitability, and economic risk using damage functions, stochastic simulations, and uncertainty propagation.
- Develop meta-analytic, ensemble, and machine-learning workflows and reproducible R tools for model fitting, comparison, prediction, simulation, and interpretation.

EDUCATION

Ph.D. Candidate in Plant Pathology | Universidade Federal de Viçosa (UFV) **2023-Present**
Viçosa, Minas Gerais, Brazil
Doctoral dissertation: Modeling the damage and risk of target spot epidemics in soybean.
Expected dissertation defense: Late 2026

M.Sc. in Plant Pathology | Universidade de Brasília (UnB) **2023**
Brasília, Federal District, Brazil
Research focus: Large-scale spatial risk assessment of plant-parasitic nematodes in maize, modeling occurrence, population heterogeneity, environmental drivers, and damage-threshold probabilities.

B.Sc. in Agronomy | Centro Universitário de Mineiros (UniFimes) **2020**
Mineiros, Goiás, Brazil

DEVELOPED RESEARCH SOFTWARE AND DECISION-SUPPORT TOOLS

EpiExposure - R package for environmental exposure-lag-response modeling

- Research software for fitting, comparing, predicting, simulating, and interpreting distributed lag nonlinear models in plant disease epidemiology, including model comparison, ensemble prediction, uncertainty propagation, and frequentist/Bayesian workflows.
  Documentation: https://tomazrg.github.io/EpiExposure/

YOLO-based image analysis workflow - quantitative plant disease phenotyping

- Imaging and computer vision platform that uses YOLO-based models for automated seed detection and health classification, enabling standardized, reproducible, and large-scale assessment of kernel smut responses to support germplasm screening and disease-resistance evaluation in rice breeding programs.
  Demonstration: https://huggingface.co/spaces/tomazrg/rice-seed

Wheat blast economic risk and break-even simulation tool

- Interactive tool for estimating break-even probability and yield gains under different control efficacy and operational cost scenarios, accounting for variation in disease resistance and yield potential among wheat cultivars.
  Demonstration: https://tomaz.shinyapps.io/WB_simulation/

Maize yield-loss and economic decision-support tool

- Interactive tool combining disease severity, yield potential, crop price, and management costs to estimate maize yield losses and economic outcomes.
  Demonstration: https://tomaz.shinyapps.io/complex/

SELECTED PEER-REVIEWED PUBLICATIONS

- **Exposure-lag responses of soybean target spot to climatic proxies: a distributed lag nonlinear modeling approach.** *Phytopathology, 2026.*
- **When does fungicide use pay off in maize? Evidence from low foliar disease pressure environments in southern Brazil.** *Journal of Phytopathology, 2026.*
- **Economic returns on fungicide use across soybean cultivars with varying tolerance to target spot caused by *Corynespora cassiicola*.** *Journal of Phytopathology, 2025.*
- **Stochastic modeling of yield loss due to bacterial leaf streak in corn.** *European Journal of Plant Pathology, 2025.*
- **Performance of two- and three-way fungicide premixes for the control of soybean target spot after seven years of use.** *European Journal of Plant Pathology, 2025.*

SELECTED ONGOING RESEARCH

- EpiExposure: An R package for exposure-lag-response analysis in plant disease epidemiology. Manuscript under review by coauthors; package submitted to CRAN.
- Bridging exposure profiles and disease prediction: an ensemble framework for soybean target spot. Manuscript in preparation (predictive modeling).
- Quantifying yield and economic losses from rice sheath blight across genotype responses: a simulation framework using damage functions. Manuscript in preparation (yield-loss modeling).
- High-throughput phenotyping of kernel smut in rice seeds using a SAM-YOLO framework under different lighting conditions. Manuscript in preparation (computer vision and phenotyping).

LANGUAGES AND INTERNATIONAL COLLABORATION

Portuguese: native. **English:** professional working proficiency.

Research experience in Brazil and the United States, collaborating across plant pathology, crop protection, computational agronomy, and quantitative phenotyping.