Germano Costa-Neto

Predictive Breeding & Quantitative Genetics

Av. Pádua Dias, 11, São Dimas, Piracicaba, Brazil

germano.cneto@gmail.com +55 (62) 981977367 @gcostaneto

Brazilian, 30 year-old, married, one-child.

Web Site: https://github.com/gcostaneto

EDUCATION

- PhD Genetics & Plant Breeding (2018-expected June 2021), University of São Paulo, Piracicaba, São Paulo, BR
  - *Thesis*: Novel enviromic-aided approaches for genomic prediction in maize across diverse environments
  - *Advisor*: Roberto Fritsche-Neto (USP) & Jose Crossa (CIMMYT)
- MS Plant Breeding (2017), Federal University of Goiás, UFG: Goiânia, Goiás, BR
  - *Thesis*: Integrating environmental covariates and thematic maps in genotype-environment interaction analysis in upland rice
  - *Adivsor*: João Batista Duate (UFG) & Adriano Pereira de Castro (Embrapa)
- BS Agronomy (2015), Federal University of Goiás, UFG: Goiânia, Goiás, BR
  - *Thesis*: Use of crop simulation models to support environmental characterization in rice
  - *Advisor*: Alexandre Bryan Heinemman (Embrapa)

AWARDS

2019   Winner at Rolland Vencovsky Award, III International Meeting on Plant Breeding/Corteva

2018   Finalist at Rolland Vencovsky Award, II International Meeting on Plant Breeding/Corteva

2017   Finalist at Young Talent Award, Embrapa Rice & Beans

APPOINTMENTS

- 2021 (August) **Postdoctoral Associate in Genomics**

  Institute for Genomic Diversity, Cornell University, Ithaca, NY, U.S.
  Objective: Develop prediction-based tools merging different sources of omics
  Manager: Edward Buckler

- 2018-present **Graduate Researcher on Quantitative Genomics and Enviromics**

  Allogamous Plant Breeding Laboratory (Prof. Roberto Fritsche-Neto' Lab): Piracicaba, São Paulo, BR
  Objective: Develop data-driven tools to interplay ecophysiology and genomic selection for diverse environments

- 2020 **Research Intern at Biometrics and Statistic Unit (BSU/CIMMYT)**

  International Maize and Wheat Improvement Center (CIMMYT)**:** Texcoco, MX
  Objective: Internship in Genomic Prediction during my PhD
  Manager: José Crossa

- 2018-2020 **Remote Freelancer Consultant in Statistics for Marketing & Product Development**

  Limagrain Field Seeds (Marketing Sector, as an external consultant): Londrina, Paraná, BR
  Objective: Develop computational solutions to easy field-testing analysis of pre-commercial cultivars
  Manager: Lee Anderson Porto (2018-2020); Leandro Santos (2020).

- 2015-2017 **Graduate Research Assistant at Rice Breeding Program**

  Brazilian Agricultural Research Corporation (EMBRAPA): Santo Antônio de Goiás, Goiás, BR

  Objective: Develop and apply techniques to better use environmental data in cultivar testing and typing target regions;

  Manager: Alexandre Bryan Heinemann; Adriano Pereira de Castro

- 2017 **Lecturer in Biostatistics**

  Universidade Paulista-Instituto Objetivo, Goiânia, Goiás, BR

  Objective: Develop teaching and communication skills

- 2013-2015 **Undergraduate Research Assistant at Ecophysiology Lab of Embrapa**

  Brazilian Agricultural Research Corporation (EMBRAPA): Santo Antônio de Goiás, Goiás, BR

  Objective: Develop programming skills for modeling biological process of plants growth and development;

  Advisor: Alexandre Bryan Heinemann

- 2011-2013 **Undergraduate Research Assistant at Agrometeorology Lab of UFG**

  Federal University of Goiás, UFG: Goiânia, Goiás, BR

  Objective: First contact with scientific research focused on modeling crops growing environments

  Advisor: Prof. Derblai Casaroli; Prof. Vládia Correchel.

REFEREED PUBLICATIONS (last 2 years)

Fritsche-Neto, R., Galli, G., Costa-Neto, G., Borges, K. L. R., Alves, F. C., Sabadin, J.F., Lyra, D. H., Morais, P.P.P., Andrade, L.R.B., Granato, I., and Crossa, J. Optimizing genomic-enabled prediction in small-scale maize hybrid breeding programs: a roadmap review (under review, review paper for the Genomic Selection Edition of the *Frontiers in Plant Science*) doi: 10.3389/fpls.2021.658267

Crossa, J., Fritsche Neto,R., Montesinos-López, O.A., Costa-Neto, G., Dreisigacker, S., Montesinos-López, A., and Bentley, A.R. (in press). The modern plant breeding triangle: optimizing the use of genomics, phenomics and enviromics data. *Frontiers in Plant Science* doi:10.3389/fpls.2021.651480

Costa-Neto, G., Galli, G., Carvalho, H. F., Crossa, J., and Fritsche-Neto, R. (2021). EnvRtype: a software to interplay enviromics and quantitative genomics in agriculture. *G3 Genes|Genomes|Genetics*. doi:10.1093/g3journal/jkab040.

Galli, G., Sabadin, J.F., Costa-Neto, G. and Fritsche-Neto, R. (2020) A novel way to validate UAS-based high-throughput phenotyping protocols using in silico experiments for plant breeding purposes. *Theoretical and Applied Genetics*. https://doi.org/10.1007/s00122-020-03726-6

Costa-Neto, G., R. Fritsche-Neto, and Crossa, J. (2020) Nonlinear kernels, dominance, and envirotyping data increase the accuracy of genome-based prediction in multi-environment trials. *Heredity* (Edinb) https://doi.org/10.1038/s41437-020-00353-1

Costa-Neto, G., O. P. Morais-Júnior, A. B. Heinemann, A. P. de Castro, and J. B. Duarte (2020) A novel GIS-based tool to reveal spatial trends in reaction norm: upland rice case study. *Euphytica* 216: 1–16. https://doi.org/10.1007/s10681-020-2573-4

Costa-Neto, G., Duarte, J. B., de Castro, A. P., and Heinemann, A. B. (2020) *Uso de Informações Ambientais na Modelagem e Interpretação da Interação Genótipo × Ambiente*. Embrapa Rice & Beans Boletin, Santo Antônio de Goiás [Portuguese for 'Use of environmental information in modeling and interpreting G×E']

Costa-Neto, G., Galli, G and Fritsche-Neto, R. (2019) Genomic × envirotyping kernels drive to a better prediction and understanding of maize yield plasticity, III International Meeting in Plant Breeding (conference-poster)

Costa-Neto, G., Galli, G. and Fritsche-Neto, R. (2019) Ecophysiological models improve prediction accuracy in genomics-assisted maize breeding. 10th Brazilian Congress in Plant Breeding (conference-poster)

Heinemann, A. B., J. Ramirez-Villegas, J., Rebolledo, M. C., Costa Neto, G., and Castro, A. P. (2019) Upland rice breeding led to increased drought sensitivity in Brazil. F. Crop. Res. 231: 57–67. https://doi.org/10.1016/j.fcr.2018.11.009

Costa-Neto, G. and Heinemann, A. B., (2018) Envirotyping for identifying regional impacts in upland rice breeding strategies over the last 30 years in Brazil. II International Meeting in Plant Breeding (conference-poster)

WORKS IN DEVELOPING (under review)

Costa-Neto, G., Crossa, J. and Fritsche-Neto, J Enviromic assembly increases accuracy and reduces costs of the genomic prediction for yield plasticity. *Article* (Abstract accepted, under review)

Gervatovsky, R., Carvalho, H. F., Costa-Neto, G., Montesinos-López, O.A., Crossa, J. and Fritsche-Neto, J Enviromic-based Kernels Optimize Resource Allocation with Multi-trait Multi-environment Genomic Prediction for Tropical Maize. *Article* (under review)

Heinemann, A. B., Costa-Neto, G. and da-Matta, D. H. Enviromic prediction is useful in defining the limits of climate adaptation for dry beans in Brazil (Abstract accepted, under review)

INVITED TALKS

- Modeling GxE using phenotypic, genomics and enviromics. *Workshop EuGeM, UFG*, 2021
- Envirotyping-informed tools for G×E analysis. *I Intergen, Plant Science Symposia Series*, Brazil, 2020
- Envirotype-to-phenotype modeling in genomic prediction across multiple environments. *ESALQ Seminars,* 2020
- Genotypic adaptation by factorial regression and geographical covariates. *VII International Symposium on Genetics and Breeding*, 2016

SOFTWARE

I develop the following software:

- E2PA (envirome-phenome association analysis, under development) *R package*
- EnvRtype (interplay enviromics and genomics in agriculture) *R package*, https://github.com/allogamous/EnvRtype
- frGIS (with thematic maps for crop adaptation diagnosis) *R package,* available at: https://github.com/gcostaneto/frGIS