

MWP – Young Researcher Abstract 2025

Project title: Enviromics as a tool for operational clone allocation in <i>Eucalyptus</i> spp.	
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Abstract (approx. 200 words): Genotype by environment interaction (G×E) is a key challenge in forestry, especially as environmental instability increases due to climate change. Allocating the right genetic material to each specific site is essential not only to maximize productivity, but also ensure the long-term sustainability of planted forests. To address this, my research applies enviromics, a new tool in plant breeding that combines genetic and environmental information with predictive modeling in a Big Data context. I studied several clones of <i>Eucalyptus</i> spp. and used data from over 3,800 environmental variables to model how each clone performs under different conditions. A predictive model was trained using Random Forest and validated through spatial cross-validation. The model showed high accuracy ($R^2 = 0.91$) and was used to generate maps indicating the best-performing clone for each pixel area. By comparing the predicted productivity of the recommended clone to that of the currently planted clone, results suggest that switching to the most suitable clone can increase yields by around 10%. This means more productivity without expanding planted areas. In addition to guiding practical deployment decisions, this approach contributes to forests that are more resilient to environmental change and supports smarter, more sustainable forestry.	
Key words: G×E interaction, enviromic, prediction, Big Data, environment, climate change	