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## Use eco-physiological modelling to investigate Potassium limitation of wood productivity in tropical eucalypt plantations

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Potassium (K) is essential for a wide range of physiological functions in plants, and a limiting element for wood productivity in numerous forest ecosystems. However, the contribution of each of the K-sensitive physiological processes to the limitation of wood productivity is poorly known. In trees, K deficiency acts both on the source and the sinks of carbon making it difficult to disentangle its effects on wood productivity. The literature dealing with the influence of K-limitation on tree physiology while disparate, shows some converging results. Furthermore, K-limited tropical *Eucalyptus* plantations have been studied extensively over the last 2 decades. Large scale fertilization experiments, run over multiple rotations, allow us to gain insight into the ecosystem's K-cycle as a whole and the physiological processes that are impacted the most by K deficiency. Mechanistic modeling of this system should allow us to quantify the relative contribution of each process when it comes to wood productivity limitation by K. We have thus adapted an eco-physiological model (CASTANEA-CNP), previously used in temperate forest settings, to use in tropical eucalypt plantations. This has led us to adapt existing nutrient (N and P) eco-physiological modeling frameworks specifically for K as well as focus on processes that are little impacted by N and P availability but greatly by K availability. The biological K-cycle model was calibrated using the comprehensive experimental data. Carbon and water fluxes were calibrated using data from a flux tower site (Eucflux) with the same environmental conditions as the experimental plots. The development of a new canopy generation model was mandated by both the continuous nature of leaf generation in *Eucalyptus grandis* and the major interaction between leaf ontogeny and the K-cycle. At first we focus mainly on carbon assimilation at the canopy level. Here we present the preliminary results obtained by this model.