

# Climate effect on volume response for mid-rotation fertilization in clonal eucalypt stands

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## HIGHLIGHTS:

- The mid-rotation fertilization x climate interaction results in different volume responses in forest plantations;
- There is a dearth of studies evaluating this interaction and its effect on Eucalyptus plantation yield in Brazil;
- We offered a modeling approach that relates clonal eucalypt yield in fertilized and non-fertilized trials as a function of climatic variables;
- The understanding of this interaction is a critical step in the decision making since it allows better site-specific management while respecting the financial constraints.

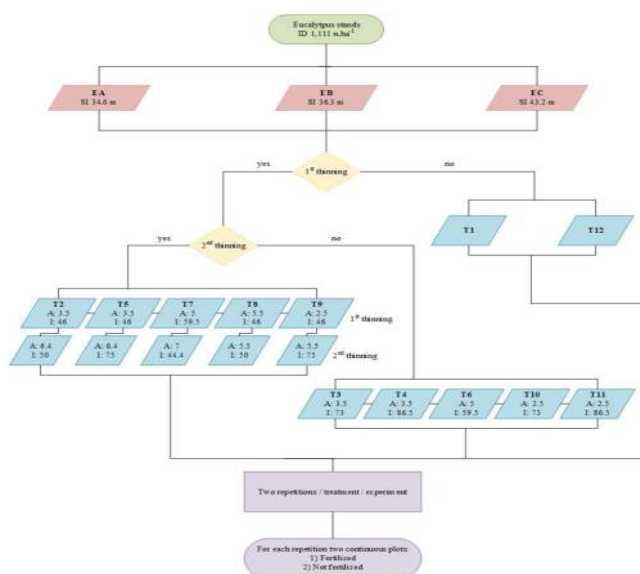
## STUDY AREA



**Figure 1:** Political-administrative division of Brazilian territory. Where the study area is highlighted (Northern Espírito Santo to Southern Bahia).

## DATA DESCRIPTION

- Three clonal eucalypt trials established in 1999 (annual re-measurements between 2001 and 2014);
- Plot area ranging from 438 to 1034 m<sup>2</sup>;
- Mid-rotation fertilization:
  - 1<sup>st</sup> thinning: 35, 61, 105 and 1.5 kg.ha<sup>-1</sup> of N-P-K and dolomitic limestone;
  - 2<sup>nd</sup> thinning: 37 and 111 kg.ha<sup>-1</sup> of N-K;
- Climatic variables: rainy days, precipitation, temperature, solar radiation and evapotranspiration;
- Relating measurement data to climatic variables:
  - in space: inverse square distance method (IQD);
  - in time: annually.



**Figure 2:** Diagram of data structure.

Where: EA, EB and EC are the experimental trials; SI is the site index (m), T1, T2, ..., T12 are the treatments, A is the age in years, I is the thinning intensity in %.

## METHODOLOGY

- Modeling stand attributes, such as the dominant height, basal area, and volume in a recursive system of equations (McTague, 2008) incorporating the effect of mid-rotation fertilization x climate interaction through the use of semi-parametric regression;
- Ridge regression is a modeling approach that enables the evaluation of how the interaction affects productivity gains as well as to identify the climate variables that most limit the fertilization effect on these gain (Scolforo et al., 2017).

## EXPECTATION

We expect to develop a growth and yield system capable of quantifying the influence of environment-management interaction on the productivity of clonal eucalypt stands in Brazil.

## REFERENCES

- McTague JP. 2008. Modelling the response of loblolly pine to juvenile fertilization. The Open Forest Science Journal 1: 80-88.
- Scolforo HF et al. 2017. Incorporating rainfall data to better plan eucalyptus clones deployment in eastern Brazil. For. Ecol. Manag. 391:145-153.