Simulation for replanting eucalyptus: A review

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Abstract. Eucalyptus more preferable because of its rapid growth, original origins, and versatile use. Technological innovation and development have a significant influence on the industry with eucalyptus raw materials. In long-term planning on forest productivity, analyzing variability and climate change, and their impacts, foresters, and companies use the most promising tools for eucalyptus-based models. Growing credibility and accuracy of choice-making in the forest system is paramount. Forest simulation models can estimate the yield of Eucalyptus in various climates and soil sorts if nicely calibrated. Reducing the estimated error of Eucalyptus results can also be reduced by using a multi-model ensemble. This study conducted a literature review on Simulation for Replanting Eucalyptus. Obtained 20 relevant literature for qualitative analysis based on the years 2000-2020, along with several areas that were the focus of research.

1. Introduction
Commercial eucalyptus plantations can produce more than 19 million hectares worldwide. Climate exchange may affect the wooded area sector appreciably. Several factors of research on warming in winter and increasing dry season duration lead to excessive events such as forest fires. This will affect the geographical distribution and composition of the plant community and the viability of vegetation. Theoretically, the model is not suitable for solving explosions under different than those determined during plot measurements; it is not enough as a method to help yield under weather changes.

![Graph showing research journal based on years](image)

**Figure 1.** Research journal based on years

2. Literature review
2.1. Eucalyptus' history
From various directions it has been planted, the genus of more than five hundred species is Eucalyptus. Outside of the Australia’s native environment, planting of basic eucalypts is carried out in Malaysia and the Philippines, started in 1904 in Brazil. At some stage in the tropical zone, Eucalyptus plantations cover twelve million ha to date, 90% of which have been connected by seeing that 1955. In the early twentieth century or at the end of the nineteenth century, Geneva was added to East Africa, with help from the start, the seventies around eucalypts had reached 95,684 ha in Uganda, Rwanda, Kenya, Sudan, and Ethiopia. At that time, Rwanda and Ethiopia are the largest plantations, each covering forty-two...
thousand ha and twenty-three thousand ha. The possible negative impact of these plantations on the environment is quite concerning, which ends with banning planting on agricultural land, seizing two territories and circulating banks. An order was issued after being introduced to Ethiopia, which ordered to uproot half of the eucalyptus trees. The same thing continues to happen even today in Uganda, Rwanda, Kenya, Sudan, and Ethiopia for fear.

Several technical, ecological, and socio-monetary arguments are mostly criticized. He cited that the blame would apply equally to other individual bushes planted in many countries; they're now not abnormal to the eucalypts. On the one hand, this very well-known crop is considered by farmers as an income crop. Still, eucalypts are blamed for being detrimental, significantly dampening water flow, suppressing other vegetation, abrasion motives, and poor yields on soil nutrition [5].

2.2. Approach to accomplishing a literature review eucalyptus

The literature review relies on several guidelines. Depending on all types can be useful, a methodology that wants to achieve the reasons for discussion and is suitable for attaining specific objectives (for the explanation, refers to Table 1).

Table 1. Summary and review of several papers contained

| Authors                  | Contains                                                                 | Factor                                                                                                                   | Place   |
|--------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------|
| Ahmed Attia et al.       | Predict accurately eucalyptus at a regional scale by applying a process-based model | • Simulation of the G'Day model. • Multi-site calibration approach. • Model prediction of biomass variables • Calibrate the model. | Brazil  |
| Quang-Vu Bach et al.     | The builder of the biomrefaction torrefaction model is comprehensive, in providing relevant information for the industrialization and commercialization processes. | • Experimental data. • Drying for heat needs. • Optimal temperature for torrefaction time. | Norway  |
| Renato Vinicius Oliveira Castro et al. | The extent of personal trees, using artificial neural networks (ANN). | • Networks are evaluated using independent data sets. • The results showed an underestimated bias for the number of trees still alive. • The approximate the midpoint, elevation, and volume in line with hectare turn out to be accurate. • The arguments against the planting of the eucalypts are grossly generalized. • Dissenters have the potential to damage this tree for the livelihood of small farmers. | Brazil  |
| Gessesse Dessie et al.   | The history, description, and status of Eucalyptus in east Africa | Fiber and chemical investigations of various eucalyptus species as well as dimensional analysis | Africa  |
| Dharm Dutt               | Chemical, pulp and paper characteristics, and morphological to get good pulp results | • Multistep extraction. • Combination of operating conditions | India   |
| Rui M. A. Domingues et al. | Carried out with pure carbon dioxide and modified to recover the Fluid extraction (SFE) fraction from Eucalyptus globulus. | Adapt, evaluate, calibrate and improve performance of Next Generation Eucalyptus clones. | Portugal |
| Elvis Felipe Elli et al. | Long term forest planning and simulation of best management strategies | • Multistep extraction. • Combination of operating conditions | Brazil  |
| Authors | Contains | Factor | Place |
|---------|----------|--------|-------|
| Elvis Felipe Elli et al. | Performance appraisal using an ensemble approach from APSIM, FAO, and 3PG models. | • Evaluation of APSIM, FAO, and 3PG models under soil types, contrasting climates, and genotypes.  
• Calibration estimates with simulation models.  
• Multimodel approach (ensemble). | Brazil |
| Elvis Felipe Elli et al. | Assessment of the subsequent effects of temporal and spatial climatic variations on eucalyptus productivity with a Process-based approach. | • Weather conditions of eucalyptus.  
• The results of the growth of eucalyptus.  
• Simulated average increase (MAI). | Brazil |
| Benjamin Engler et al. | The development of current performance is based on the harvest productivity model. | • Process data collection from harvesting operations  
• Harvesting operation  
• Overcome the cost deficit by mechanizing work. | Germany |
| J. Garcia-Gonzalo, J G Borges and J H N Palma. | Development of research tools in the forest management. | Use of Decision Support System (DSS) tools to be integrated  
• Management information module;  
• Decision model;  
• Solution report.  
• Cost analysis based on survey data.  
• Effect of average crop rate  
• The costs of reducing crop production.  
• Growth data of E. Saligna  
• Analysis to determine the interaction between yield and soil type, climate and management.  
• In-depth research | Portugal |
| Pamela Jagger and J Pender. | The ecological discussion surrounding the processing of eucalyptus tree planting. |  
Combining these location-specific results with geographic information systems for biomass plantations.  
Optimal eucalyptus recommendations genotype using climate and geography information.  
• The planting age is uneven between two and a half and six and a half years for the distribution of clones.  
• Eucalyptus genotype production | Ethiopia  
Hawaii  
Brazil |
| Wei Liu et al. | Increased rural livelihoods with natural capital and degraded lands. | Plantation models and financial analysis  
Integration of food and tree systems  
Growth rate and benefits of eucalyptus.  
Biomass pretreatments  
Optimization of pressure  
Optimized operating conditions for SFE curve measurement operations  
BIC model results. | Vientiane, Laos  
Democratic People’s Republic  
Portugal |
3. Methods
Research by the process of recognizing and critically investigating relevant research, as well as collecting and analyzing data from research, uses the systematic literature review (SLR) method. Literature Collection both internationally and nationally carried out using ScienceDirect, ScimagoJR Obtained 20 relevant literature for qualitative analysis based on the years 2000-2020, along with several topic areas that were the focus of research. The stages of conducting this literature review process are:

- Level 1. Designing topics and reviews: Look for sources as discussion topics for literature study material or literature reviews. Set the research topic to be reviewed as literature by the development of science from Replanting Eucalyptus knowledge.
- Level 2. Conduct review: Determine sources for literature study material or literature review based on the year of publication and place of the journal.
- Level 3. Analysis: Make a summary of the contents of these sources.
- Level 4. Writing up the review: Write a literature study or literature review.

Level 1. Designing topics and the review based Simulation for Replanting Eucalyptus knowledge.

Level 2. Conducting the review based on the year of publication and place of the journal.

Level 3. Analysis a summary of the contents of sources

Level 4. Writing up the review

Figure 2. Research methodology

This manner changed into advanced from practical experience and is a synthesis of and stimulated by various requirements and guidelines recommended for literature reviews.

4. Result and discussion
This research attempts to conduct a systematic review of simulation for replanting eucalyptus. This study obtained the main themes, namely simulation for replanting eucalyptus and eucalyptus-based modeling, with most of the literature coming from Brazil.
Figure 3. Research journal based on place

Research related to the simulation of eucalyptus replanting is related to several dimensions and aspects of the eucalyptus industry and supply chain. Starting from the process of collecting data from harvest operations, analysis to determine interactions between yields and soil types, climate, and management to decision models and solution reports.

5. Conclusions
Eucalyptus trees absorb water well from the transpiration process. Some are deliberately planted in many places to reduce the surface of groundwater. Eucalyptus was highly targeted because of its benefits in the current pandemic, so the simulation of planting must be published. However, eucalyptus is blamed for many losses, such as suppressing other vegetation, especially drainage, the purpose of abrasion of soil properties and detrimental results in the nutrient cycle.

Based on a literature review to simulate the impact of climate change on potential outcomes, using the approach of the first proposal. That is needed tools to improve environmental conditions and forest management in an effective and efficient change. Therefore, they need tools such as DSS (Decision SS) with a growth model, and the results are sensitive to environmental changes and reduce the error estimation of Eucalyptus results can also be reduced by using a multi model ensemble.

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