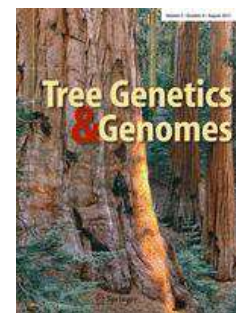


Genetic parameters for growth, wood density and pulp yield in *Eucalyptus globulus*

João Costa e Silva^{1,2}, Nuno M. G. Borralho², José A. Araújo³ & René E. Vaillancourt⁴ and Brad M. Potts⁴



1. Centro de Matemática e Aplicações, Departamento de Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, Lisboa, Portugal

2. Centro de Estudos Florestais, Departamento de Engenharia Florestal, Instituto Superior de Agronomia, Universidade Técnica de Lisboa, Lisboa, Portugal

3. RAIZ Forest and Paper Research Institute, Eixo, Portugal

4. School of Plant Science and Cooperative Research Centre for Forestry, University of Tasmania, Hobart, Australia

Tree Genetics & Genomes, 2009, Volume 5, Issue 2, pp 291–305

DOI: 10.1007/s11295-008-0174-9

Publication Date (Web): 05 September 2008

Abstract

Genetic variation and co-variation among the key pulpwood selection traits for *Eucalyptus globulus* were estimated for a range of sites in Portugal, with the aim of improving genetic parameters used to predict breeding values and correlated response to selection. The trials comprised clonally replicated full-sib families (eight trials) and unrelated clones (17 trials), and exhibited varying levels of pedigree connectivity. The traits studied were stem diameter at breast height, Pilodyn penetration (an indirect measure of wood basic density) and near infrared reflectance predicted pulp yield. Univariate and multivariate linear mixed models were fitted within and across sites, and estimates of additive genetic, total genetic, environmental and phenotypic variances and covariances were obtained. All traits studied exhibited significant levels of additive genetic variation. The average estimated within-site narrow-sense heritability was 0.19 ± 0.03 for diameter and 0.29 ± 0.03 for Pilodyn penetration, and the pooled estimate for predicted pulp yield was 0.42 ± 0.14 . When they could be tested, dominance and epistatic effects were generally not statistically significant, although broad-sense heritability estimates were slightly higher than narrow-sense heritability estimates. Averaged across trials, positive additive (0.64 ± 0.08), total genetic (0.58 ± 0.04), environmental (0.38 ± 0.03) and phenotypic (0.43 ± 0.02) correlation estimates were consistently obtained between diameter and Pilodyn penetration. This data argues for at least some form of pleiotropic relationship between these two traits and that selection for fast growth will adversely affect wood density in this population. Estimates of the across-site genetic correlations for diameter and Pilodyn penetration were high, indicating that the genotype by environment interaction is low (...)

(Versão não integral, documento não disponível em open access)