



IUFRO Conference 2023

First *Eucalyptus benthamii* Maiden & Cambage seed orchard in Argentina

Palazzini, D. A. ¹; Pathauer, P. S. ¹; Harrand, L. ²; Schoffen, C. ³; Oberschelp, G. P. J. ²; Cappa, E. P. ¹

¹ Instituto Nacional de Tecnología Agropecuaria (INTA), Buenos Aires, Argentina

² Instituto Nacional de Tecnología Agropecuaria (INTA), Entre Ríos, Argentina

³ INTeA SA, Buenos Aires, Argentina

Received 17 Aug 2023

Accepted 01 Sep 2023

Published 20 Nov 2023

 Correspondence

Pablo Santiago Pathauer,
pathauer.pablo@inta.gov.ar

Eucalyptus benthamii Maiden & Cambage (*E. benthamii*) grows in temperate climates with humid summers, with average temperatures ranging between 14 and 18°C, 2000 mm of annual precipitation, and up to 40 frost days.year⁻¹, with minimum temperatures reaching -10°C. Currently, in Argentina there is no availability of improved seed for commercial plantations. Based on these factors, the National Institute of Agricultural Technology (INTA) started an *E. benthamii* breeding program to provide improved seeds as an alternative for plantations in regions with higher frost frequency. Through the INTA - IPEF agreement (Institute of Forestry Research and Studies), seeds were imported from 30 families of this species. Between 2017 and 2018, four trials were established in the provinces of Buenos Aires (34°36'S, 58°39'W), Entre Ríos (31°22'S, 58°07'W), Corrientes (28°26'S, 58°59'W), and Misiones (27°39'S, 55°26'W). The following traits were assessed: survival (SUR), height at 1 year (H1), height at 4 years (H4), and diameter at breast height (DBH4). Pedigree-based single-site and multiple-site analyses were performed using individual-tree models for the growth traits. SUR4 rate varied across locations: 60% in Corrientes, 67% in Misiones, 80% in Entre Ríos, and 71% in Buenos Aires. Notably, Corrientes had an average H1 of 4.22 meters, while Buenos Aires had 0.90 meters due to water deficit in the first season. By the fourth year, height and diameter values became consistent. H4 ranged from 12.8 to 15.6 meters, and DBH4 ranged from 10.24 to 13.14 centimeters. Despite the drought of the years 2017 and 2019 to 2021, mainly in Buenos Aires, good growth in H4 and DBH4 is confirmed. Growth traits displayed significant heritability estimates (from 0.47 to 0.79), offering valuable guidance for selecting and advancing desired characteristics. The high genetic correlations observed among growth variables (from 0.73 to 0.86) at each site enable the flexibility to choose any of them as a selection variable. The high correlation genotyped by environment between the Buenos Aires trial and the other sites (0.74) allows the establishment of a single seed orchard to supply the entire region included in this study with improved seed. Utilizing the data obtained from the four trials, breeding values from the Buenos Aires trial were predicted, and 89 individual trees from 24 families were selected using DBH4 breeding values, for the establishment of Argentina's first *Eucalyptus benthamii* progeny seed orchard.

Keywords: *Eucalyptus benthamii*, genetic evaluation, growth traits, heritability, genotype-environment interaction

