Effect of planting density on Pinus radiata growth and branch diameter before canopy closure.

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Initial planting density is probably one of the most important silvicultural decisions affecting forest productivity and value. Although lower planting densities generate less total volume, a larger number of final crop trees reach larger diameters at younger age for sawtimber. However, low densities may produce larger branches due to individual tree crown expansion, reduce stem quality and require modelling branch growth to adjust time of pruning to get better quality wood products. The objective of this research was to evaluate *Pinus radiata* annual growth and branch diameter growth until the onset of canopy closure for 3 initial planting densities. The study was established in July 2016, on a well-drained sandy soils site, with a mean temperature of 13.2 °C and precipitation of 851 mm, in the central valley of Chile. The experimental design consisted of a complete randomized block design with three replicates, comparing 1242, 816 and 649 tree ha^{-1} initial planting density treatments. Each year since establishment, individual tree measurements of diameter at breast height (DBH) and total height (HT) were completed. In each plot, 3 trees were selected considering site treatment diameter distribution, and all branch diameters (BD) were measured along the stem until 5 m height. At age 7, there were no differences of planting density on HT and survival ($p>0.05$). The best DBH was 10.4 cm for 649 tree ha^{-1} and lowest DBH was 9.1 cm for 1242 tree ha^{-1}. However, the best volume response was at the highest density with 29.4 for 649 trees ha^{-1} vs 20.2 m^3 ha^{-1} for 1242 trees ha^{-1}. Interestingly, a linear relationship was observed between DBH and mean BD (r^2=0.89), with the highest BD in the lowest planting density with 5% of branches >3 cm, contrastingly the highest density showed only 0.9% of branches >3 cm.

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