Eucalypt clone growth in monoculture and silvopastoral system under different tree planting spatial arrangements

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Introduction

In Brazil in recent decades there has been the establishment of forests by companies and farmers in wider spacings and different spatial arrangements , in consortium with agricultural crops and pasture forming agroforestry (MORAIS, 2006; Magalhães *et al.*, 2007, Oliveira *et al.*, 2008; . OLIVEIRA *et al.*, 2009; . FONTAN *et al.*, 2011; . PAULA *et al.*, 2013).

Eucalypt has long been used in the composition of silvopastoral system (SPS) and as a monoculture, in Brazil, as the great variety of high productivity genotypes allows multiple uses. However, there is a need to evaluate the growth potential of eucalypt genotypes under different tree planting spatial arrangements.

This study aimed to evaluate the growth in height, diameter and basal area of the tree component of SPS systems and monoculture established with five eucalypt clones of *E. camaldulensis* hybrid, *E. urophylla* and *E. grandis* in the arrangements (2x2) + 10 m, (3x3) + 9 m and 9x3 m, intercropped with *Brachiaria brizantha* cv. Marandu (silvopastoral systems) and under monoculture (3,6x2,5 m and 3,3x3,3 m), in the savannah region, Southeastern Brazil.

Materials and Methods

The Gompertz model was adjusted to obtain growth in total average height and diameter, and basal area, at different spatial arrangements for each clone, based on data up to the age of 62 months.

The equations were compared using identity nonlinear models tests, and were grouped whenever they were equal to each other ($p>0.05$). The tree height differed ($p<0.05$) in relation to spatial arrangements only for the clones GG100 and 58 in the spatial arrangement 3.6x2.5 m, which presented the lowest values when compared to other arrangements. The highest average height was 34.6 m (GG100 clone) in the arrangements 3.3x3.3 m, (2x2) + 10 m, (3x3) + 9 m and 9x3 m, which were equal to each other ($p> 0.05$).

Results and Discussion

The smallest tree diameter growth was observed for clone 58, 02 and GG100 in the 3,6x2,5 m arrangement. In general, the arrangements 3,6x2.5 m, 3,3x3,3 m and (2x2) + 10 m, with the highest population density, presented the lowest asymptotic values for diameter. Basal area growth different for most clones and spatial arrangements ($p <0.05$), being the lowest values observed for the arrangement 9x3 m for all clones. Both arrangements with higher plant density had the highest asymptotic values for basal area, being the highest values observed for the clones 02 (24.8 m^2ha^{-1}) and 62 (24.5 m^2ha^{-1}).

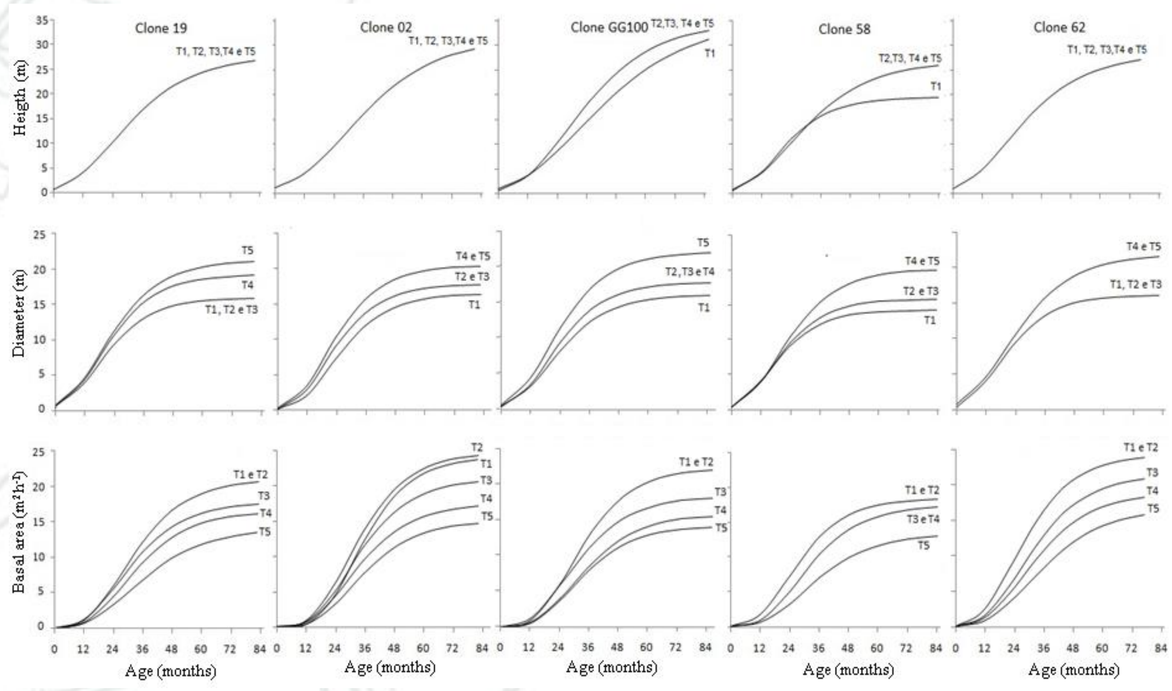

Figure 1: Growth in height (m), diameter (cm) and basal area (m^2ha^{-1}), according to age (months) of plants, five clones of eucalyptus and spatial arrangements of planting in Vazante, MG. Seing: T1 = 3,6x2,5 m; T2 = 3,3x3,3 m; T3 = (2x2) + 10 m; T4 = (3x3) + 9 m e T5= 9x3 m

Final Considerations

The overall results indicate that the spatial arrangement should be selected for each genotype, according to the use of the wood. The arrangement (3x3) + 9 m can be recommended for the production of sawn timber and poles due to the increased tree diameter growth, and denser stands should be adopted for charcoal and paper production.

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