

# Use of soil respiration as a trial of drought susceptibility in *Eucalyptus* genotypes

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Soil respiration ( $R_s$ ) is important in the carbon cycle; it is regarded as an indicator of plantation metabolism due to its close relationship with biological activity in the soil. However, this component lacks rigorous experimental studies considering its use as a drought indicator. This study evaluated  $R_s$  and increment diameter breast height (iDBH) of *Eucalyptus globulus* and *E. nitens* x *globulus* (high and low yield), *E. nitens*, *E. badjensis*, *E. smithii*, and *E. camaldulensis* x *globulus* in drought conditions (~25% over permanent wilting point). Measurements were carried out from 2020 to 2023 (7 to 9 yr-old);  $R_s$  was measured monthly with a chamber LICOR-8200s; iDBH was evaluated seasonal. The results showed annual  $R_s$  0.75 to 1.42 gC/m<sup>2</sup> and iDBH of 0.4 to 14.4 mm with maximum values in summer (December to February) and minimum in winter (June to August). Also, a strong correlation between  $R_s$  and DBH increment ( $r$ -value=0.88) is explained with the equation  $iDBH=1.29 \cdot R_s$  ( $R^2=0.85$ ,  $p$ -value=0.002). It was resulting in three groups: i. *E. globulus* and *E. nitens* x *globulus* (low productivity) as high drought susceptibility with minimum  $R_s$  and iDBH values (average 0.83 gC/m<sup>2</sup>/yr and 0.85 mm/yr, respectively); ii. *E. nitens*, *E. badjensis*, *E. smithii*, and *E. camaldulensis* x *globulus* with moderated drought susceptibility with average  $R_s$  of 1.08 gC/m<sup>2</sup>/yr and iDBH of 9.60 mm/yr. iii. *E. globulus* and *E. nitens* x *globulus* (high productivity) were classified as low drought susceptible maximum  $R_s$  and iDBH (average 1.38 gC/m<sup>2</sup>/yr and 13.8 mm/yr, respectively). Our results suggest that  $R_s$  is an ideal trait to differentiate *Eucalyptus* genotype susceptibility to drought and its effect on growth.

Keywords: Soil respiration; productivity; drought; modelation.