

Biomass and carbon pools of Eucalyptus trees in integrated crop-livestock-forest systems

José Ricardo Macedo Pezzopane ^{*† 1}, Cristiam Bosi ², Alberto Carlos Campos Bernardi ¹, Marcelo Dias Müller ³, Patricia Perondi Anção De Oliveira ¹

¹ Empresa Brasileira de Pesquisa Agropecuária (Embrapa Pecuária Sudeste) – Rod. Washington Luis, km 334, PO Box 339, ZIP Code 13563-970, São Carlos, SP, Brazil

² Universidade de São Paulo (USP/ESALQ) – Depto. de Engenharia de Biosistemas. USP/ESALQ. POBox 9, ZIP Code 13418-900, Piracicaba, SP, Brazil

³ Empresa Brasileira de Pesquisa Agropecuária (Embrapa Gado de Leite) – Av. Eugênio do Nascimento, 610 - Cascatinha, CEP 36038-300, Juiz de Fora – MG, Brazil

Integrated livestock production systems (iCLF), in which trees and crops are cultivated in rotation, succession or association with pastures, are alternatives for the sustainability of agriculture. This study aimed to estimate biomass and carbon pools of trees in three kinds of Integrated Crop-Livestock-Forest Systems. The systems were composed by a pasture of *Urochloa brizantha* (BRS Piatã) and eucalyptus trees (*Eucalyptus urograndis*, GG100), planted in April 2011 in single rows with 15 m spacing and 2 m spacing between plants in the rows, totaling 333 trees ha⁻¹. Three systems were evaluated: i) crop-livestock-forest system with pasture renewal in the second year after trees planting (ICLFS-2); ii) crop-livestock-forest system with pasture renewal in the third year after trees planting (ICLFS-3); and iii) livestock-forest system, with no pasture renewing (ILFS). Each system had four experimental plots of 5,000 m². Pasture renewal was performed with grass and silage corn (*Zea Mays* L. var. DKR 390 PRO 2) simultaneously sowed. The data were collected in April 2016, when 40 trees were harvested to determine wood volume and to gather wood rings, and samples of tree canopy and roots subsequently used to determine biomass and carbon pools. These data were used to build the equations for estimating stem volume and tree biomass. Stem diameter at breast height (DBH), at 1.3 m above the ground and tree height (H) were measured in 10% of the trees of each plot. The estimated stem volume ranged from 131.8 to 155.7 m³ and stem biomass from 56.9 to 67.5 Mg ha⁻¹, respectively, in the livestock-forest system and crop-livestock-forest system with pasture renewal in the second year after tree planting. The most productive crop-livestock-forest system accumulated 30.7 Mg ha⁻¹ of carbon in tree stem at five years after the system implementation.

Keywords: Eucalyptus urograndis, agrosilvipastoral, Urochloa brizantha, sustainability

*Speaker

†Corresponding author: jose.pezzopane@embrapa.br