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Economic Viability of Biochar Use in Aerobic Rice Production in the Brazilian Cerrado

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Abstract

In Brazil, biochar, a by-product of charcoal production from plantation timber (*Eucalyptus* sp.), is being tested as a soil amendment to improve soil fertility and in turn increase sustainability of aerobic rice production systems (mainly rainfed). Thus, this study aimed to assess the economic viability of biochar use in aerobic rice production in the Brazilian Cerrado. The study has been carried out with field experiments at two sites: Nova Xavantina (MT) and Santo Antonio de Goiás (GO). At MT site, results were based on cropping seasons 2008/2009, 2009/2010 and 2010/2011; and at GO site, results were based on seasons 2009/2010 and 2010/2011. Treatments consisted of a combination of two nitrogen fertiliser levels (0 and 90 kg N ha⁻¹ in GO; and 0 and 75 kg N ha⁻¹ in MT) and four levels of biochar (0, 8, 16 and 32 tons ha⁻¹). Biochar was obtained from *Eucalyptus* charcoal residues of 2.00 mm particle size. Biochar was incorporated into the soil only once, before the sowing of the first crop. It was done in one single application, in season 2008/2009 in MT and in season 2009/2010 in GO. Revenues were generated by paddy rice yields, considering market price in April of each considered year (R\$ 32.30/bag of 60 kg paddy in 2008/2009, R\$ 29.00 in 2009/2010 and R\$ 27.00 in 2010/2011). Production costs considered are mulching, direct seeding, fertilisation, weed control and harvest operations. Under market price conditions, in all treatments, the costs were higher than the revenues. After using a sensitivity test, varying the market prices for a 60 kg bag paddy rice from R\$ 30 to R\$ 45, only at GO in the cropping season 2009/2010 the results were promising. The most promising economic results were obtained using 90 kg N and 8 tons biochar per hectare. At current market prices for conventional long-grain rice, however, it was not as viable as expected. If aerobic rice yields increase and producer get an additional price for their production (niche markets), then it may become an interesting option under certain conditions.

Keywords: By-product, economic feasibility, Eucalypt charcoal fine, sensitivity analysis, soil amendment