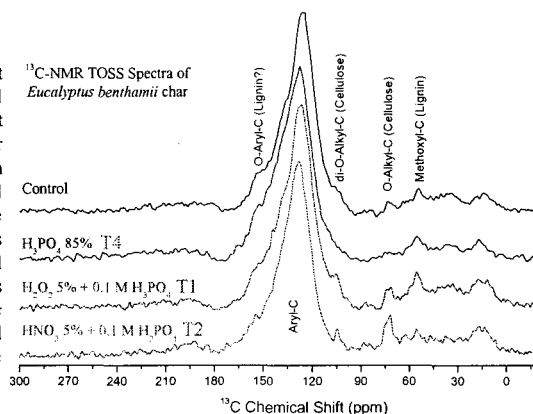


Carlos Francisco Brazão Vieira Alho<sup>1</sup>; Etelvino Henrique Novotny<sup>2</sup>;Claudia Maria Branco de Freitas Maia<sup>3</sup>; Edson Lima de Azevedo<sup>3</sup>; Fabricio Augusto Hansel<sup>3</sup><sup>1</sup> Department of Soil, Universidade Federal Rural do Rio de Janeiro, Seropédica, Brazil. e-mail: carlos.alho@hotmail.com;<sup>2</sup> EMBRAPA Solos, Rio de Janeiro, Brazil;<sup>3</sup> EMBRAPA Florestas, Colombo, Brazil

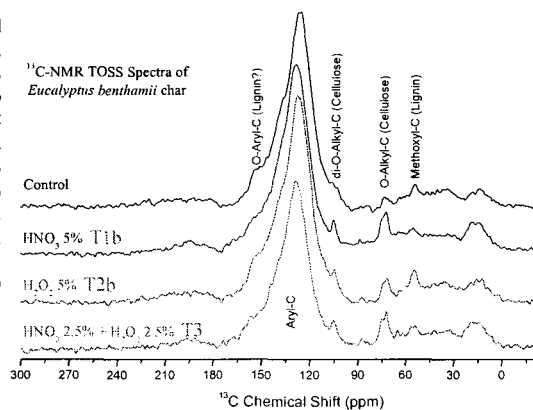
## Introduction

The charcoal presents condensed aromatic groups that guarantee its recalcitrant nature, being an efficient material for sequestering carbon in soils. However, it does not present acid groups, important for its reactivity and contribution for the soil capacity of cationic exchange. Its application upon soil, and consequent biological and chemical alterations will generate those acid groups, however that trial can take decades. In this context, preliminary studies indicate that it is possible to promote those chemical alterations by chemical (acid oxidation), biological or enzymatic via. The aim of this study was to promote the chemical oxidation of *Eucalyptus benthamii* charcoal, intending the formation of functional groups attached to the charcoal's condensed aromatic structure.



## Material and Methods

The charcoals were prepared using the conventional pyrolysis method (carbonization) at 500 °C for 2 hours, obtaining an average of 36.4 % charcoal, 33.8 % pyrolysis liquor and 29.8 % gases. The charcoals were submitted to four treatments (T1, T2, T3 and T4) using 2 g of charcoal (< 0.05 mm) and 20 mL solution. The different solutions used were: H<sub>2</sub>O<sub>2</sub> 5 % and H<sub>3</sub>PO<sub>4</sub> 0.1 mol L<sup>-1</sup> to T1; HNO<sub>3</sub> 5 % and H<sub>3</sub>PO<sub>4</sub> 0.1 mol L<sup>-1</sup> to T2; H<sub>2</sub>O<sub>2</sub> 2.5 % and HNO<sub>3</sub> 2.5 % to T3; H<sub>3</sub>PO<sub>4</sub> 85 % to T4. The four treatments were heated at 70 °C for 2 hours using digester block. Solid-state <sup>13</sup>C NMR experiments were carried out using a VARIAN INOVA spectrometer at <sup>13</sup>C and <sup>1</sup>H frequencies of 100.5 and 400.0 MHz, respectively. The pulse sequence used was Total Suppression of Spinning Sidebands (TOSS) with typical cross-polarisation times of 1 ms, acquisition times of 13 ms, and recycle delays of 500 ms were used.



## Results and Discussion

Results shows that the treatments used in this study did not promote significant modifications in the charcoal structure, such as the formation of functional groups. Although, Trompowsky et al 2005, found significant chemical modifications, such as increments in Nitrogen and Oxygen contents, and formation of carboxylic groups after acid oxidation, treated with HNO<sub>3</sub> 25% (w/w) during 4 h under reflux conditions. These, indicates that it is possible to promote those alterations by chemical oxidation of charcoal.

## Conclusion

According to the data obtained by Solid-state <sup>13</sup>C NMR experiment, the treatments used did not promote significant modifications in the charcoal.

## Acknowledge

The authors are grateful to the Irish Research Council for Science, Engineering and Technology (IRCSET – Ireland) and National Counsel of Technology and Science Development (CNPq - Brazil) for the financial support.