Geophysical Research Abstracts
Vol. 14, EGU2012-4061-1, 2012
EGU General Assembly 2012

Effects of biochar produced from different feedstocks on soil properties and sunflower growth

J.A. Alburquerque (1), J.M. Calero (1), R. Villar (1), V. Barrón (2), J. Torrent (2), M.C. del Campillo (2), and A. Gallardo (3)

(1) Universidad de Córdoba, Área de Ecología, Córdoba, Spain (jalburquerquemendez@yahoo.es), (2) Universidad de Córdoba, Área de Producción Vegetal, Córdoba, Spain, (3) Universidad Pablo de Olavide, Área de Ecología, Sevilla, Spain

The use of biochar obtained from biomass pyrolysis as a soil amendment has potential benefits, such as reduction in gas emissions, increase in soil carbon sequestration and improvements in soil fertility and crop yield. These constitute a great incentive for the implementation of biochar-based strategies, which could contribute to improvement of the sustainability of agricultural systems. However, to date, the results of research studies show great variability as a result of differences in both the raw materials and the pyrolysis conditions used to produce biochar, as well as in the experimental setting (crop, soil type, pedo-climatic conditions, etc.).

The aim of this study was to evaluate the effects of five types of biochar produced from representative agricultural and forestry wastes (olive husk, almond shell, wheat straw, pine woodchips and olive tree prunings), and applied to soil at different rates, on soil properties and sunflower (Helianthus annuus L.) growth.

The biochars had a high organic matter content, alkaline pH, variable soluble salt content and non-phytotoxic properties. The addition of biochar to soil increased pH, electrical conductivity and water retention capacity, and decreased soil bulk density compared to control (unamended soil). However, these effects differed depending on biochar type. In contrast, no consistent effects on sunflower growth variables were observed due to the addition of biochar: increases were observed in some variables (plant dry weight, leaf area and height), but these increases were, in general, not statistically significant when compared to the unamended soil. This can be explained by the nature of biochar, being rich in carbon but relatively poor in nutrients.

In summary, our results indicate that biochar is capable of improving soil properties which can impact positively on soil-plant water relations, without negative effects on sunflower growth, and therefore it is suitable for use as a long-term carbon sink in agricultural soils, with both agricultural and environmental benefits.