



Sugarcane straw harvest effects on soil quality and plant growth: preliminary data synthesis of a multi-local project running in Brazil

Maurício Cherubin (1), Carlos E.P. Cerri (2), Brigitte J. Feigl (1), and Carlos C. Cerri (1)

(1) University of São Paulo, Center for Nuclear Energy in Agriculture, Piracicaba, SP, Brazil (cherubin@usp.br), (2) University of São Paulo, Luiz de Queiroz College of Agriculture, Piracicaba, SP, Brazil

Brazil is the largest sugarcane producer in the world, and consequently, it is one of major players in the bioenergy production sector. Despite that, growing demands for bioenergies have raised the interest of Brazilian sugarcane industry to harvest the sugarcane straw left on the field for cellulosic ethanol production and/or bioelectricity co-generation. However, crop residues have a key role in the soil, affecting directly or indirectly multiple soil functions and related ecosystem services. Therefore, indiscriminate straw harvest could jeopardize soil quality, decreasing its capacity to sustain plant productivity over time. In order to evaluate the potential impacts of sugarcane straw harvest on soil quality and plant growth, we are conducting since 2014 a multi-local project across central-southern Brazil, the main core of sugarcane production in the world. A wide range of soil chemical, physical and biological parameters, as well as, plant biomass production has been quantified under increasing straw harvest intensities. Our preliminary findings have showed that short-term straw harvest management did not affect total organic C stocks; however, high straw harvest led to significant reduction in labile C forms (e.g., microbial biomass C and N), and abundance of microbial communities as well. Sugarcane straw harvest affects soil nutrient cycling, since significant amount of nutrients are removed annually by straw, especially in top (green) leaves. In addition, our data show that straw acts as a thermal insulator, decreasing soil temperature amplitude and keeping soil moisture for a longer time. Straw harvest management did not affect sugarcane yields in the first two crop seasons. Based on this first synthesis of the project, we conclude that short-term sugarcane straw harvest led to soil changes, especially in more sensitive and dynamic properties, which did not affect the plant yield. However, long-term impacts should be monitored towards a better understanding about potential trade-offs and synergies associated with sugarcane straw harvest for bioenergy production in Brazil.