Geophysical Research Abstracts
Vol. 21, EGU2019-13530, 2019
EGU General Assembly 2019


# Comparing different forms of crop residue recycling assessed by soil aggregation and carbon accumulation in a paddy soil

Xin Xia and Genxing Pan

Nanjing Agricultural University, Institute for Resource, Ecosystem and Environment of Agriculture, China (xinxia@aliyun.com)

Recycling of crop biomass residue had been a management practice for reinforcing soil organic matter (SOM)-degraded soils in agriculture. With the ban of crop residue burning in fields, how they could be better recycled as for SOM enhancement in agricultural soil had been not fully addressed. In this study, input of maize straw biomass of intact residue (CS), converted as manure (CM) and as biochar via pyrolysis (CB) were applied at 10 t C ha-1in a paddy soil, once in June 2015, in comparison to no direct addition (CK). The topsoil samples collected after wheat harvest in 2018 and soil water stable aggregate size fractions separated and tested for contents of organic carbon contents. The results showed that mass proportion of macroaggregates was increased under CM and CB by respectively 24.93% and 18.75% while unchanged under CS. Meanwhile, SOC content in macroaggregate and microaggregate was seen greatly increased under CB respectively by 32.07% and 11.74%. Values of $\delta$13C of the aggregate size fractions were all significantly higher under straw biomass return than under CK. However, those of macroaggregate and microaggregate (‰) under CB (-23.97 and -23.60 ‰) were significantly higher than in CK (-26.99 and -27.33 ‰). Mass balance estimation revealed a dominant allocation of maize derived OC in macroaggregates and, to lesser extent, in microaggregates and silt particles. Particularly, OC from biochar amended was 45.9 % in macroaggregates, and 39.9% in microaggregates. A significant but slight proportion of maize biomass derived OC was found in clay sized fine particles (2.90 % under CS, 2.35% under CM and 0.53 % only under CB). Finally, an enhancement of soil aggregation, free- and occluded particulate carbon in macroaggregates was observed only under CB. Overall, addition of crop straw residue as pyrolyzed biochar could be the most efficient form of recycling crop wastes contributing to soil aggregation and soil carbon sequestration.
Keywords: crop residue; soil organic carbon, soil aggregation, rice paddy, biomass recycling