11th International Conference
Humic Substances in Ecosystems (HSE11)
Wrocław – Kudowa Zdrój, Poland
29th May – 1st June 2017

Organic Matter of an Amazonian sandy soil as affected by forest burning

Deborah P. Dick[a,b*], Maurifran O. Lima[a], Falberni S. Costa[c], Janaína B. da Costa

[a]*Department of Soil Science, Faculty of Agronomy, Federal University of Rio Grande of Sul /UFRGS-, Avda. Bento Gonçalves, 7712, 91540-000 – Porto Alegre, RS- Brazil.* [b]*Institute of Chemistry, UFRGS-, Avda. Bento Gonçalves, 9500, 91501-970, Porto Alegre, RS- Brazil.* [c]*Agroforestry Research Center of Acre, EMBRAPA, BR364 Road, km 14, Rio Branco Porto Velho PO BOX 321 - 69900-970 Rio Branco, AC. maurifranoliveira@gmail.com. debby.dick@gmail.com, falberni.costa@embrapa.br.*

Key words: Humic substances, pyrogenic C, Amazon tropical forest, biomarkers, tropical soil

In the Amazon region, forest burning is still common in spite of the governmental control. Pyrogenic C produced by the fire, due to its aromatic structure, may represent a C pool of small turnover rate and its addition to the soil may increase C sequestration and alter the SOM composition and dynamics. This study aimed to investigate the impact of vegetation burning on content and chemical composition of soil organic matter (SOM) along a profile of a sandy Acrisol in Southwestern Amazon, Brazil, within 3 years after burning (3Y). The study was performed in Rio Branco, Acre State, and the forest burning was performed under controlled conditions. Samples from 6 layers (0-100cm depth) were collected with three field replicates under burned forest (BF) and primary forest (PF) at 1Y and 3Y. Besides C and N contents, humic substances were quantified and biomarkers were determined. Under PF, the C content decreased with depth from 12 to 2 g kg^{-1}. Burning of vegetation promoted an increase of C and of humic acids only at 0-5 cm within 1Y. In PF, C/N ratio ranged from 7.6 at the surface to values around 3 at 1 m depth. In BF the C/N ratio values were greater at 0-10 cm depth and also reached low values at deeper layers. These values are typical for biomass and indicate that, regardless the fire, SOM is mainly composed by microbial products. The content of humin along the profile was negligible in both sites, evidencing that SOM was mainly composed by functionalized humic matter. PF sample showed a bimodal distribution profile of *n*-alkanes, with series ranging from C_{17}-C_{31} and predominance of even over odd with maximum at C_{18} and C_{19}. This is a characteristic profile of contribution of both microbial products and higher plants to SOM lipids. BF sample showed unimodal distribution profile and a shift of *n*-alkanes towards smaller chains, with maximum at C_{16}, C_{17} and C_{18}. This pattern indicates SOM lipids mainly from microbial origin. PAH's of high molecular weight were detected in this site. The higher SOM content at 0-5cm after forest burning within 1 year was due to hydrophilic humic substances. Intense climate conditions, i.e. high rainfall and temperature, cause this rapid humification and efficient mineralization of organic residues. SOM in deeper layers is mainly composed by microbial products. It seems that in Amazon region, alterations in SOM due to fire have also an impact in deeper layers, but the effects tend to disappear shortly.
Acknowledgements: CNPq (Brazil)