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Hien Nguyen
United Kingdom (vxn368@student.bham.ac.uk)

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Nguyen Van Hien (a,b); Eugenia Valsami-Jones (a); Iseult Lynch (a)
a) School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, B15 2TT Birmingham, United Kingdom
b) Department of Land Use, Soil and Fertilizer Research Institute, Hanoi, Vietnam

Abstract
This study compares the physico-chemical characteristics of various biocchars produced from biomass residues in Vietnam such as fired wood, rice husk, and bamboo. Wood biochar (WBC), rice husk biochar (RHBC), and bamboo biochar (BBC) were produced under limited oxygen conditions using equipment available locally in Vietnam, known as a Top-Lift Updraft Drum (TLUD). The three biochars are alkaline with pH around 10, but were found to have quite significantly different physico-chemical characteristics. Surface areas (measured by BET) were found to be very significantly higher for WBC and BBC with 479.34 m2/g and 434.53 m2/g, respectively, compared to RHBC (3.29 m2/g). The SEM images correspond with the BET surface area, showing a smooth surface for RHBC, a hollow surface for BBC, and a rough surface for WBC. Total carbon (TC) of WBC and BBC are above 80%, while RHBC has only 47.95% TC. Despite having different TC, the content of hydrogen among the biochars is similar, ranging from 2.07% to 2.34%, and the ratio of H/C also follows the same trend. Thus, although the biochars are produced by the same method, the various feedstocks lead to different physico-chemical properties. Ongoing work is linking these physico-chemical properties to fertiliser efficiencies in terms of nitrate and ammonia adsorption and retention capacities, in order to design optimal biochar properties for use in fertilisation.
Key words: physico-chemical characteristic, biochar, surface area, SEM, total carbon, feedstock