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Plant development effects of biochars from different raw materials

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Biochar can provide multiple benefits in the ecosystem. However, the presence of phytotoxic compounds in some biochars is an important concern that needs to be addressed and that depends on the raw material and the pyrolysis conditions used in biochar production. For example, sewage sludge biochars can have elevated heavy metal contents as they were present in the feedstock and were enriched during pyrolysis. Also during carbonization, some phytotoxic compounds such as polycyclic aromatic hydrocarbons (PAHs), polyphenols or volatile organic compounds (VOCs) could be formed representing a risk of contamination to soils and crops. In this work we report the results from seed germination and plant development for three biochars prepared from wood, paper sludge plus wheat husks and sewage sludge. Five higher plant species (cress, lentils, cucumber, tomato and lettuce) were studied. Biochar from wood shows seed inhibition in several species and the paper sludge biochar on lettuce. For the rest, the effect on seed germination was positive. No inhibition of root growth was detected, but in some cases leaves and stems growth were inhibited. Our results are significant in terms of advancing or current understanding on the impacts of biochar on vegetative growth and linking those effects to biochar properties.