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Pyrogenic carbon from wildfire or from the laboratory

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Wildfires remove well-developed vegetation but restore it from an ecological point of view, although they are often called disasters when their intensity and extent in forests are large. Thermochemical decomposition of organic material at high temperatures (200 - 750 °C) in the absence of oxygen (or any halogen) to decompose biosolids has been recognised as a method with numerous benefits for waste management, carbon sequestration and sustainable agriculture. The effects of pyrogenic carbon (PyC) from wildfire and from the laboratory are believed to be different. The evidence to date is informative in bridging pyrogenic carbon from wildfire and pyrolysis, including aspects of: 1) PyC as a microsite for microbial communities; 2) the role of PyC of different sizes in soil aggregation; 3) the role of the soil microbiome in soil aggregation; 4) nutrient release - phosphorus availability in PyC. Future work is needed to investigate 1) the role of nano- or micro-sized PyC in the guts of soil fauna - nutrient uptake and function of the microbiome; 2) linking municipal biowaste to carbon sequestration; 3) improving efficiency in composting and vermicomposting; and 4) negative impacts on soil fauna such as earthworms. Knowledge of PyC in materials science, waste management and environmental microbiology offers opportunities to make breakthroughs in biowaste management and climate change mitigation.