

Phosphorus release from biochars prepared from rice husks, grape pomace and olive tree prunings

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Biochar samples were prepared from rice husks, grape pomace and olive tree prunings by pyrolysis at 300°C and 500°C and used for phosphorus batch successive leaching experiments. Results of P leaching tests showed a continuous release of P from all biochars as compared to raw biomass samples, where the highest concentrations were detected during the first extraction. Grape pomace and rice husk biochars pyrolyzed at 500°C showed higher levels of water-extractable P, as compared to their corresponding raw biomass. However, the fraction of water extractable P released, in relation to the total P content, was higher for raw biomass samples of grape pomace and rice husk (ranging from 75% to 94% respectively), as compared to the corresponding biochar samples at 500°C pyrolysis temperature (ranging from 18% to 27% for grape pomace and rice husk biochars respectively). Biochars, at 500°C, leached more P in all four extractions, compared to biochars at 300°C, apart from olive tree prunings biochars, where both pyrolysis temperatures presented a similar trend.

Rice husk and grape pomace biochars produced by pyrolysis at 300°C were applied to two temperate soils with contrasting pH and their effect was assessed on ryegrass (*Lolium perenne* L.) yield and phosphorus availability. Concerning plant yield of ryegrass, rice husk and grape pomace biochars showed positive statistically significant effects on plant yield in slightly acidic soil in second and third harvest, while in alkaline soil no significant effects were observed in all three harvests. Between the two types of biochar, no significant difference ($P < 0.05$) on plant yield was observed for both soils. However, in terms of P uptake of ryegrass, positive significant differences ($P < 0.05$) were detected mostly in alkaline soil, and grape pomace biochar gave a significant higher P uptake than rice husk in the first two harvests.