NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
Advanced Environmental Biotechnology Centre
Nanyang Environment and Water Research Institute

Sewage sludge biochar as P-fertilizer

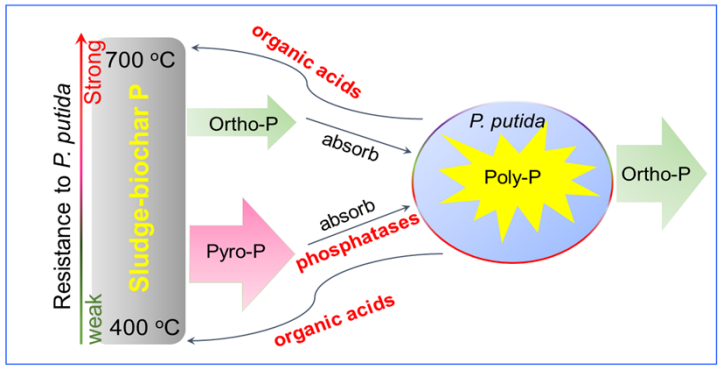
Objective

To understand the feasibility to use sewage biochar as P-fertilizer and understand the transformation pathway of different P species in sludge-biochar mediated by soil microorganisms.

Research members

Zhou Yan (Asst Professor); Qian Tingting (Research Fellow); Desmond Chua Feng Jun (Ph. D student)

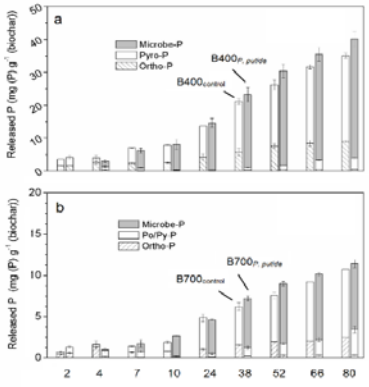
Graphic abstract

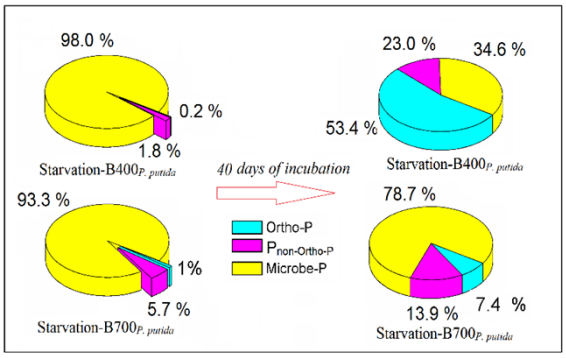


The release of biochar-P could be enhanced by *P. putida.* The P species in B400 were more vulnerable to *P. putida* than those in B700, as the P species in B400 had lower polymerization degree and poorer crystal structure than those in B700 did. The Pyro-P released from biochar could be easily transformed into Ortho-P by *P. putida*, which can further benefit other species in soil.

Results

The result shows that the total P released in experimental group ($B400_{P.\ putida}/B700_{P.\ putida}$) was significantly higher than that released in control group ($B400_{control}/B700_{control}$) ($p<0.05$). From 40th day onwards, high level of Ortho-P was detected in the bulk of Starvation-$B400_{P.\ putida}$.





Conclusions

Soil bacteria played a regulating role on biochar-P release. It could not only enhance the release of biochar-P and utilize all types of the released P (i.e. Ortho-P and Pyro-P) in biochar, but also release the P back to the environment. This study provides insights on the release behavior of sludge biochar-P under a biotic condition, and confirms its suitability for soil application.