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EBNet Travel Bursary Support
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10th International Conference on Engineering for Waste and Biomass Valorisation (WasteEng2024) 20-23 August 2024, Sendai, Japan

Sequestration of multidrug resistant clinical bacterial isolates by precision engineered waste lignocelluloaic biochars

Dr Paul-Enguerrand Fady

In August 2024, I travelled to the WasteEng2024 conference held Sendai (Japan) thanks to a generous travel bursary provided by EBNet. I was fortunate enough to be selected to present an interdisciplinary research project which arose from a collaboration between three members of the EBNet-funded 'Biochars to Prevent Pollution' working group, led by Dr Meredith Barr. WasteEng 2024 proved an excellent vehicle for disseminating our findings, as well as connecting with international experts in the fields of waste engineering and biochar applications.

The work in question concerns the design and development of bespoke biochars derived from waste lignocellulosic biomass, to create novel wastewater filters which remove both antimicrobial compounds and multidrug-resistant bacteria. This is an exciting application of technology to biological waste streams which contributes to the remediation of bacterial antimicrobial resistance (AMR). Bacterial AMR is a very serious health threat, directly responsible for 1.27M deaths/annum and linked to almost 5M deaths (as of 2019). The costly and inefficient development of new antimicrobials will not suffice to stem the rise of AMR, and novel solutions such as the one developed and tested by the three working group members are key to tackling this threat.

I presented our findings, which show (among other things) that upwards of 95% of specific drug-resistant clinical bacterial isolates and 91% of clarithromycin (an antibiotic which drives AMR development) can be removed from wastewater through inline filtration with our system. This was a fairly unique presentation at WasteEng, which was attended by few microbiologists and even fewer colleagues with clinical expertise. The presentation was well received and acted as a good catalyst for discussions around precision applications of biochars.

For presentation contact EBNet

10th International Conference on Engineering for Waste and Biomass Valorisation **WasteEng²⁴** August 20-23, 2024 Sendai, Japan

Sequestration of multidrug-resistant clinical bacterial isolates by precision engineered waste lignocellulosic biochars

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Dr Fady's presentation at WasteEng2024

This project links applied microbiology (using patient-derived clinical strains) with engineering and systems optimisation of biochars from agricultural waste. Our work on fine-tuning the ability of biochars to sequester bacteria has a range of exciting applications at the water-wastes-soil nexus, including this preventative application but also developing a better understanding of the production conditions which could be employed in remediative soil applications (e.g. soil microbiome seeding). WasteEng 2024 provided an excellent sandbox for exploring these thoughts with colleagues from all different disciplines.

The travel bursary also enabled interactions with experts from across the world, including researchers from Strasbourg (France), London (Canada), and closer to home in Milton Keynes (UK). This conference was a fantastic opportunity to raise awareness about the EBNet Biochar Working Group, spread our findings to an expert community who might not otherwise have been aware of them, and build links with an international audience of researchers. We have since submitted a paper detailing all of our findings, which is currently under review. I hope to be able to share it with the EBNet community in the near future.

Huge thanks to EBNet for this unique opportunity!