

ORGANICS & BACTERIAL REDUCTIONS by TREATMENT BMPs

We evaluated the treatment of highway runoff in terms of the removal of Polycyclic Aromatic Hydrocarbons (PAHs) and Fecal Indicator Bacteria (FIB). We compared treatment by the standard bioretention mix of 60% sand, 40% compost (by volume), and three other blends amended with biochar and fungi.

Project outcomes

Every mix removed PAHs stormwater at high rates (>97% for all but 2 samples) when compared to influent concentrations. Bioretention soils with a 50% replacement (by vol.) of compost with biochar, had lower soil PAH concentrations than those in the standard 60:40 mix. The concentrations of PAHs in soil decreased over the course of the study despite inputs of PAHs from influent stormwater. This result suggests that microbial bioremediation or plant uptake of PAHs is the mechanism for PAH removal in bioretention mixes. Greater losses of PAHs (69-79%) were observed in the fungi amended bioretention mix compared with the standard mix (54-70%). More replication over a longer study period is needed to determine if fungi improve PAH bioremediation in bioretention soils. Fecal coliform and *E. coli* removal were variable, as were influent concentrations which spanned 3 orders of magnitude.



Treatment of FIB was observed for most samples after initial stormwater dosing, though high variability in effluent FIB concentrations prevented detection of treatment effects.

FUTURE OPPORTUNITIES

Our findings suggest that biochar and fungi may offer pollutant reduction benefits as bioretention amendments. Biochar is produced from organic wastes and is a form of long-term carbon storage. Future research should address the feasibility of using biochar as a partial replacement of compost in bioretention systems to reduce pollutant export from compost, while storing carbon and reducing waste streams. Fungi seem to play a role in PAH bioremediation in bioretention soils, but additional research is needed to confirm these findings. A longer period of study that employs a more mechanistic approach towards elucidating FIB removal is critically needed. This study showed mix age is an important term in FIB removal.



LINKS

Project web page:

<https://www.wastormwatercenter.org/project/pah-bacteria-project/>