Sustainable soil management during construction stockpiling – Bicton field trial

Background

Soil stockpiling will impact soil quality, structure and biodiversity (DEFRA, Construction Code of Practice for the Sustainable Use of Soils on Construction Sites 2009), sometimes degrading soil quality. However, less is known about the impact soil stockpiling has on soil carbon stocks and how to mitigate soil degradation in a construction context.

Researchers at Eden Project Learning working on the ReCon Soil project, have designed a long-term experiment, hosted at Bicton College, to address these questions.

Trial site

A series of soil stockpiles, hosted at Bicton College, were created in August 2022, and sown with amenity grass or herbal ley seed mixes, and applied woodchip.

Monthly sampling and analysis is examining changes in carbon and nitrogen content, and microbial activity, at 0-30 cm and 90-100 cm depths within the stockpiles.

Questions

- Carbon and nitrogen stocks will decrease in stockpiled soil, will sowing grass and other plants reduce losses, and will they actively increase carbon stocks?
- What effect does soil stockpiling have on microbial communities?
- What effect does woodchip application on stockpiled soils have on carbon stocks and microbial communities?

Figure 1. Bicton College site (Picture source: Google, 2022)

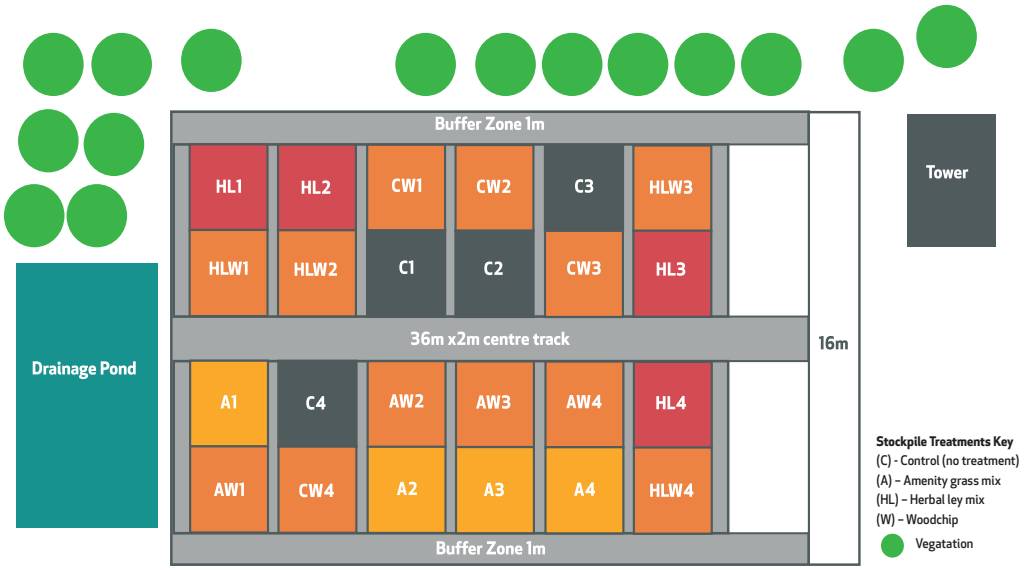

Figure 2. A diagram of the study site and experimental design of the soil stockpiles

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Results

The amount of carbon in the soil stockpiles increased over time, however no significant differences were observed between treatments (Figure 3). There does appear to be a trend towards higher carbon levels in the herbal ley treatments. This was similar for the microbial activity where there was a trend towards less activity in the control treatments.

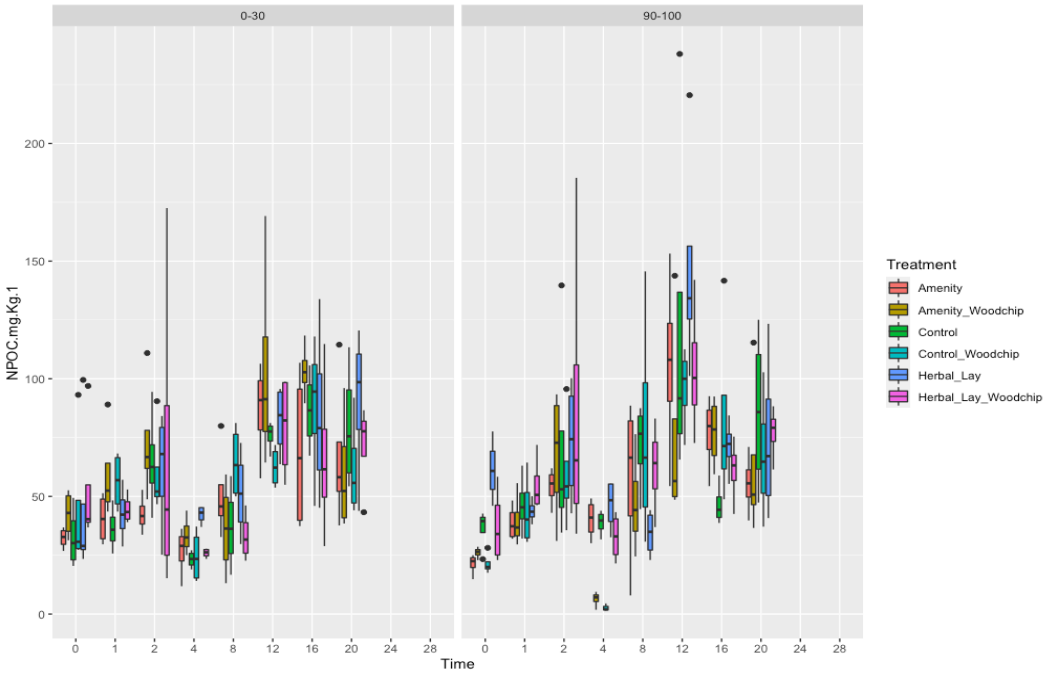

Figure 3. Amount of Non Purgeable Organic Carbon (NPOC) in the soil stockpiles over time and comparing treatments

Impacts

- Trends are appearing to suggest that seeding stockpiles could increase soil carbon stocks. However, further research is required in this area
- This study has highlighted the importance of monitoring soil stockpiles and such activity could be included in material management plans in order to promote sustainable soil management on site and reduce soil wastage.

Future research?

- Are longer timeframes needed to compare soil carbon stocks in construction soils?
- Compare different types of soil in stockpiles, e.g. greenfield, brownfield and contaminated, are there differences in carbon storage and microbial activity?
- Is it possible to improve soil quality during stockpiling? i.e. brownfield and contaminated soils
- How long does it take for soil carbon stocks, soil structure and biology to recover after respreading of soil?