The North American Forest Soils Conference, first held in 1958, has been organized every five years for researchers to share and discuss the latest developments in forest soils. In 2018, the 13th NAFSC was held jointly with the 9th International Symposium of Forest Soils, which has been meeting since 1990. This combined conference, “Soils-Forest Interaction in Changing Environments,” had six thematic sessions, including sessions on fire effects, management practices, and societal change.

The Soil Science Society of America Journal is publishing papers from this joint conference in a special issue in August. To give readers a sense of the diversity of the papers included in this special issue, several are summarized below. Special thanks to guest editors Deborah Page-Dumrose, Research Soil Scientist with the U.S. Forest Service, and Jennifer Knoepp, Interim Project Leader and Research Soil Scientist with the Forest Service.

Identifying Humic Soils? There’s an App for That!

Standardizing the classification of humic soils has been challenging. Humic soils are the top layer, where there is high biological activity, and often includes vegetation that is breaking down and can be hard to define. To add to the complexity, different regions have their own systems and...
historical classifications, which do not always apply globally.

To aid in the classification of humic soils, researchers first had to develop a common system. This process, which took over five years, resulted in standardization which has been subsequently turned into an app. Similar to the dichotomous keys that now exist in app form for plants, TerrHum prompts a user to answer yes/no questions to aid in the identification of soil. TerrHum (combining terrestrial and humipedon) uses these questions, photos, and geolocation data.

In addition to aiding in the identification of humic soils in the field, TerrHum is also building a database. Users can upload their location and new photos, which will improve the maps of humic soils across the globe. The authors also discuss potential for this app to expand to include other soils, putting a field guide in the pocket of users with smartphones.

Is There a Use for Bioenergy Ash Waste?

Ash is an abundant by-product of bioenergy production that needs to be disposed of. One proposed use for this ash is as a soil amendment to mimic some of the effects of wildland fire rather than being buried in a landfill. Wildland fires remove vegetation, heat soil, and leave ash, which often provides a pulse of nutrients back to the soil and charcoal. In some regions, vegetation clearing is used as a way to reduce fire risk or mimic some fire effects as part of restoration efforts. Researchers report the results of a meta-analysis in which they compare/explore wildfire and ash addition experiments from around the globe.

While not surprising, this analysis confirms differences between wildland fire and ash addition on soils. Because the heat of fire oxidizes C and volatilizes N, the C and N loss following treatments is greater for wildfire. However, ash additions increased extractable P concentrations compared with fire, and changes in pH and exchangeable Ca were similar between fires and ash additions.

This meta-analysis approach provides useful information and reveals some knowledge gaps. For instance, most of the ash studies were conducted in Europe and most wildfire studies in North America, making it difficult to compare similar ecosystems. Nevertheless, applying ash to forest landscapes may be a useful alternative to disposal in landfills to improve soil quality and reduce waste. Additional research is needed to determine the potential benefits of this application.


Restoration Efforts—From the Soil to the Trees

Restoring an ecosystem often involves manipulation of vegetation, removal of invasive or unwanted species, and replanting natives. In addition to manipulating the flora and fauna, successful restoration activities often require understanding how actions taken aboveground will impact the soil—both nutrient dynamics and microorganisms.

In the southeastern U.S., restoring longleaf pine forests often requires clearing vegetation, mechanically and with prescribed fire, and planting longleaf pine seedlings.
It is common to use herbicide around planted seedlings to reduce competition and aid in the establishment of these trees. In this study, researchers tested differences in timing and number of applications of herbicide on pine survival and growth and how assays impacted soil N, recognizing that these chemical treatments can impact not only pine growth but also soil biogeochemistry.

The authors report that use of imazapyr did not have a negative impact on longleaf seedlings when applied in the second growing season after planting and that sulfometuron methyl and hexazinone were not suggested for use at wet sites, such as the study site. Imazapyr treatments had higher levels of ammonification and N mineralization compared with control samples. And there was little indication of an impact of any treatment on soil microbial and fungal biomass.

Overall, the study suggests that as private and public landowners are incentivized to restore longleaf pine habitat in the southern U.S., imazapyr applications in the second growing season were the most effective strategy for establishing planted longleaf seedlings.


doi:10.2134/csa2019.64.0803

The analysis focused on two ARGs. While the data from individual storms varied, in general, the observed trends for the ARGs were similar for raw manure and compost treatments, and ARG presence was greater in early storms than those later in the season or post vegetable harvest from the field plots. It was notable that the ARG trends were different from those observed for the fecal indicator bacteria, a trend that has been observed in other studies of runoff, suggesting that fecal indicator bacteria monitoring cannot be used to predict the presence, quantity, or movement of ARGs. The observed complexity of interacting factors and the influence on pathogen movement suggest a need for detailed data collection of runoff to aid in improving management practices to reduce the potential of pathogens, ARB, and ARGs being carried away from agricultural fields as the environmental and human health impacts are still being determined.