89291
oral

Microbes in mine reclamation: Bioecology, biofertilizers, bioeconomy
Andrew Harley*, *SWCA Environmental Consultants*, *Broomfield, CO USA*.
andrew.harley@swca.com

Microorganisms play an important role in restoring degraded land, improving nutrient and carbon cycles, and soil structure, suppressing plant diseases and supporting plant productivity. The term microbiome refers to a community of microorganisms –bacteria, fungi, algae, and protozoa – that live and interact together in a defined environment. Microbiome research is generating efficient microbiome-based solutions for plant protection, fertilization, stress alleviation and plant health, while promoting biodiversity and sustainability. When applied to mine reclamation, these reduce costs related to sourcing and transporting large volumes of external capping materials and/or soils. Phytostablization is the use of plant roots to absorb pollutants from the soil and retain them within the rhizosphere, with metal mobility reduced by precipitation around plant roots, root sorption, metal valence reduction and metal complexation. The objective for successful phytostablization is the long-term succession of a plant community achieved through the promotion of soil development processes, microbial diversity, and restoration of soil ecosystem functions producing self-sustainability. While reactive organic amendments such as biosolids and compost can support short-term plant establishment, long-term growth and recruitment of revegetated plant species require systematic development of soil properties and production of a functional technosol. The current state of this approach is reviewed and a demonstration case is presented where this approach was used during reclamation of dispersed tailings of an abandoned gold mine. Implications for broader community revitalization via the bioeconomy will be discussed regarding the potential to support both climate change mitigation and adaptation, and Sustainable Development Goals.
Keywords: Microbes, PRPR, AMPs