

## The Effects of Green Manure Returning on Properties and Fungal Communities in Vanadium/Titanium Magnet Tailings

**Authors :** Hai-Hong Gu, Yan-Jun Ai, Zheng Zhou

**Abstract :** Vanadium and titanium are rare metals with superior properties and are important resources in aerospace, aviation, and military. The vanadium/titanium magnetite are mostly ultra-lean ores, and a large number of tailings has been produced in the exploitation process. The tailings are characterized by loose structure, poor nutrient, complex composition and high trace metal contents. Returning green manure has been shown to not only increase plant biomass and soil nutrients but also change the bioavailability of trace metals and the microbial community structure. Fungi play an important role in decomposing organic matter and increasing soil fertility, and the application of organic matter also affects the community structure of fungi. The effects of green manure plants, alfalfa (*Medicago sativa* L.), returned to the tailings in situ on community structure of fungi, nutrients and bioavailability of trace metals in vanadium/titanium magnetite tailings were investigated in a pot experiment. The results showed that the fungal community diversity and richness were increase after alfalfa green manure returned in situ. The dominant phyla of the fungal community were Ascomycota, Basidiomycota and Ciliophora, especially, the phyla Ciliophora was rare in ordinary soil, but had been found to be the dominant phyla in tailings. Meanwhile, the nutrient properties and various trace metals may shape the microbial communities by affecting the abundance of fungi. It was found that the plant growth was stimulated and the available N and organic C were significantly improved in the vanadium/titanium magnetite tailing with the long-term returning of alfalfa green manure. Moreover, the DTPA-TEA extractable Cd and Zn concentrations in the vanadium/titanium magnetite tailing were reduced by 7.72%~23.8% and 8.02%~24.4%, respectively, compared with those in the non-returning treatment. The above results suggest that the returning of alfalfa green manure could be a potential approach to improve fungal community structure and restore mine tailing ecosystem.

**Keywords :** fungal community, green manure returning, vanadium/titanium magnet tailings, trace metals

**Conference Title :** ICMFFB 2024 : International Conference on Mycology, Fungi and Fungal Biology

**Conference Location :** Toronto, Canada

**Conference Dates :** July 18-19, 2024