

Approaching tailings rehabilitation from the ground up

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The abiotic characteristics of post-mining landforms often represent the most significant limitations to plant establishment and development in post-mining landscapes. The physiochemical, hydrological, and microbiological conditions presented by rehabilitation substrates often differ markedly from pre-disturbance soils, and the physiological implications of these alterations to plant growth are frequently cryptic or completely unknown. Magnetite tailings represent one of the most challenging systems to work with, particularly in the Midwest of Western Australia where the Banded Ironstone (BIF) reference systems harbour a biodiverse suite of well-adapted native flora. Preliminary studies indicate that although these tailings are not toxic (in traditional terms), they represent a hostile substrate that is geochemically completely dissimilar from any material native plants have ever been naturally exposed to. This is reflective of what many mining companies must deal with regularly in generating foreign post-mining substrates, and highlights the difficulties associated with pursuing challenging rehabilitation closure criteria. This study characterises the abiotic conditions of dry stack tailings and compares this environment to that of local reference soils, and presents the early findings of controlled environment, laboratory, and field studies unpacking the tailings system to identify some of the key issues constraining plant and microbial establishment. These data are presented in the context of the rehabilitation and economic requirements of industry, and potential amelioration and engineered soil solutions.