The Soil Program of the Restoration Seedbank Initiative project: addressing knowledge gaps in dryland restoration

Miriam Muñoz-Rojas (1,2,3), Todd E. Erickson (1,2), Amber Bateman (1,2), Tayla Kneller (2,4), David J. Merritt (1,2)

(1) University of Western Australia, Kings Park, Australia (miriam.munozrojas@bgpa.wa.gov.au), (2) Kings Park and Botanic Garden, Kings Park, Perth 6005, WA, Australia , (3) University of New South Wales, School of Biological, Earth & Environmental Sciences, Sydney, 2052, NSW, Australia , (4) Curtin University, Department of Environment and Agriculture, 6845, Perth, WA, Australia

Global environmental changes and other anthropogenic impacts are rapidly transforming the structure and functioning of ecosystems worldwide. These changes are leading to land degradation with an estimated 25 % of the global land surface being affected. In the resource-rich biodiverse semi-arid Pilbara region of Western Australia hundreds of thousands of hectares are disturbed due to established and emerging iron-ore mine operations. The need to develop cost-effective large-scale solutions to restore these landscapes becomes imperative to preserve biodiversity and achieve functionality and sustainability of these ecosystems. The Restoration Seedbank Initiative (RSB) is a five-year multidisciplinary research project that aims to build knowledge and design strategies to restore mine-impacted landscapes in the Pilbara and other arid and semi-arid landscapes worldwide. Within the soil program of the RSB, a series of glasshouse studies and field trials have been conducted in the last three years to advance our knowledge on soil limitations and to provide solutions to effectively overcome these challenges in arid ecosystem restoration. These studies include (i) the analysis of the influence of climate and edaphic factors in the recruitment of arid zone seedlings and (ii) the evaluation of soil physicochemical and microbiological indicators to assess functionality of restored soils in degraded semiarid ecosystems and (ii) the development of nature-based strategies based on bio-tools to enhance soil functionality. Here, we summarize our latest results in the soil program of the RSB, and propose recommendations for integrating soil science in cost-effective landscape-scale restoration practices in ecosystems worldwide.