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Inorganic soil amendments increase plant establishment and soil quality in dryland rehabilitation but effectiveness is dependent on water availability

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Changes in global climate patterns are amplifying the extent and rate of land degradation worldwide. Arid and semi-arid landscapes, which supports the livelihoods of one-fifth of the world's population and provides 60 % of the globes food demand, are considered the most vulnerable to climate driven landscape degradation which is occurring at a rate of 12 Mha each year. In addition to climate driven degradation in the form of increased temperatures and erratic rainfall events, anthropogenic activities, such as mining, contributes to the loss of functional ecosystems worldwide, making rehabilitation of these landscapes challenging. Here, we present a case study on two plant species native to the arid Pilbara region in north-west Western Australia, that examines the effect of soil amendments, e.g. gypsum and urea, on plant establishment and soil quality under different climate scenarios.

The aim of this study was to test soil amendments under different water amounts to assess their effectiveness to promote soil recovery and recruitment of plants used in dryland rehabilitation. Our results showed that under well-watered conditions the soil amendments increased plant growth which enhanced soil biological and chemical quality. However, water was the predominant driver for determining the effectiveness of the soil amendments with changes in soil and plant indicators significantly decreasing as water became scarce. This study contributes to understanding how soil amendments effect soil quality and plant recruitment in post-mining rehabilitation in arid regions and their role in reinstating functioning ecosystems faced with a changing climate.