Recent News

Improvement in the biochemical and chemical properties of badland soils by thorny bamboo

The research team led by Dr. Chih-Yu Chiu at Biodiversity Research Center, Academia Sinica published their recent research about the contribution of bamboo plantation in the amelioration of badland soils. The research team found through bamboo plantation, badland soil properties were significantly increased. The environmental stress on soil microbial communities was relieved in bamboo plantation soils. The founding has been published at Scientific Reports, an online open access journal from the publishers of Nature.

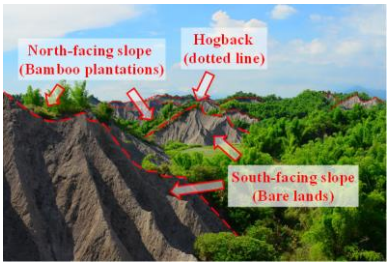
This study was carried out at three locations in southwestern Taiwan, Zuozhen, Tainan, Longqi, Tainan and Tianliao, Kaohsiung, where Plio-Pleistocene badland soils, consisting of up to 90% silt and clay combined and high soil salinity, occupy more than 10,000 ha and are devoid of vegetation. Because of the high clay content and high sodium and calcium concentrations near soil surface, the soil becomes rock-hard during dry season. While in rainy season, soils swell and soften upon water saturation and has been shown to accelerate surface erosion. Thorny bamboo (Bambusa stenostachya) is one of the few plant species that are able to grow in these uninhabitable soils. It was cultivated in the early 1900s by local residents for bamboo shoots and stems. Most of bamboo plants survive on the north-facing sides of hogbacks. While not many bamboo plants grow on the south-facing sides of hogbacks because the direct sunlight makes generally drier soil. The research team collected soil samples from both north-facing and south-facing sides of the hogbacks at each site and analysed soil biochemical and chemical properties to determine how soil quality was improved through bamboo plantation.

Results show that bamboo increased microbial C and N, soil acid-hydrolysable C, recalcitrant C, and soluble organic C and N of badland soils. High microbial biomass C to total organic C ratio indicates that soil organic matter was used more efficiently by microbes colonizing bamboo plantations than in bare land soils. High microbial respiration to biomass C ratio in bare land soils confirmed environmentally induced stress. Soil microbes in bare land soils also faced soil organic matter with the high ratio of recalcitrant C to total organic C. The high soil acid-hydrolysable C to total organic C ratio at bamboo plantations supported the hypothesis that decomposition of bamboo litter increased soil C in labile fractions.

Overall, thorny bamboo improved soil quality, thus, this study demonstrates that planting thorny bamboo is a successful practice for the amelioration of badland soils.

The first author, Dr Yo-Jin Shiau, is doing his postdoctoral research in Biodiversity Research Center, Academia Sinica.

The full research article can be reached at the following link: www.nature.com/articles/srep40561



Landscape of mudstone badlands at Zuozhen in Tainan City, Southern Taiwan. South-facing slopes are barren while north-facing slopes are covered with thorny bamboo