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Historical and current microbial activity in Australian cropped and native vertisols as determined by δ18OP analysis

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With a predicted global population of 9.7 billion by 2050, there is mounting pressure on agriculture to increase yields in food and fibre with a decrease in nutrient inputs. To determine the agricultural impact of Australian cotton farming on soil microbiology, we compared historic and current microbial activity at depth (0-100 cm) under crop and native systems using δ18OP and respiration methodologies. Differences in average δ18OP values indicated higher historical turnover under the crop system (13.7 ‰ compared to the native system (11.02 ‰, whilst current microbial activity was 100% higher under the crop system, especially between 15 and 50 cm. In these relatively dry, carbon and nutrient poor soils, microbial activity under the crop system was found to be higher than the native system, with the presence of water perhaps being the key to explaining this unique occurrence. From this investigation, we propose a model in which water drives microbial activity in the soil systems studied.