

# Greenhouse gas emissions from soil in mango and banana fields: Fertiliser and ground cover management

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Nitrous oxide (N<sub>2</sub>O) emissions from agricultural soil are contributing to global climate change. The emissions originate from microbial nitrification and denitrification processes, which are driven by complex relationships among soil water filled pore space, temperature, available nitrogen (N) and organic carbon. Banana and mangoes are tropical Australia's largest horticultural industries, with a combined value of >\$6,000 million/year and area of 23,000 ha. These industries primarily use conventional forms of N fertiliser (urea) in warm and wet conditions, a combination with the potential to produce high N<sub>2</sub>O emissions. We investigated N<sub>2</sub>O emissions from soils with conventional and alternative management practices in mango (chromosol) and banana (ferrosol) fields. Conventional management practice was the application of urea to bare soil at application rates of the local industry. Alternative management practices included a reduced application rate, the application of N fertiliser treated with the nitrification inhibitor 3,4-dimethylpyrazole phosphate (DMPP) and ground cover treatments. The ground cover treatments compared the dominant current practice (bare soil) with added mulch in mangoes or living ground cover in bananas.

N rate had the greatest impact on N<sub>2</sub>O emissions, with the highest N rates producing the greatest N<sub>2</sub>O emissions. Peak N<sub>2</sub>O rates were greater from bare soils in bananas (390 µg N m<sup>-2</sup> hr<sup>-1</sup>) than mangoes (109 µg N m<sup>-2</sup> hr<sup>-1</sup>), which is likely a result of soil type and temperature differences. Peak rates typically occurred with first rainfall (5-50 mm) within a week of N application. Treatment differences then quickly diminished in the following days. DMPP did not lower emissions in comparison to the equivalent rate of urea when applied to bare soils on both trials. However, emissions from DMPP treatments in combination with mulch reduced N<sub>2</sub>O emissions from mango soils. Samples from the living ground cover in bananas are currently being analysed.