Soil nitrous oxide emissions in agricultural systems fertilized with livestock manure, compost and inorganic fertilizers

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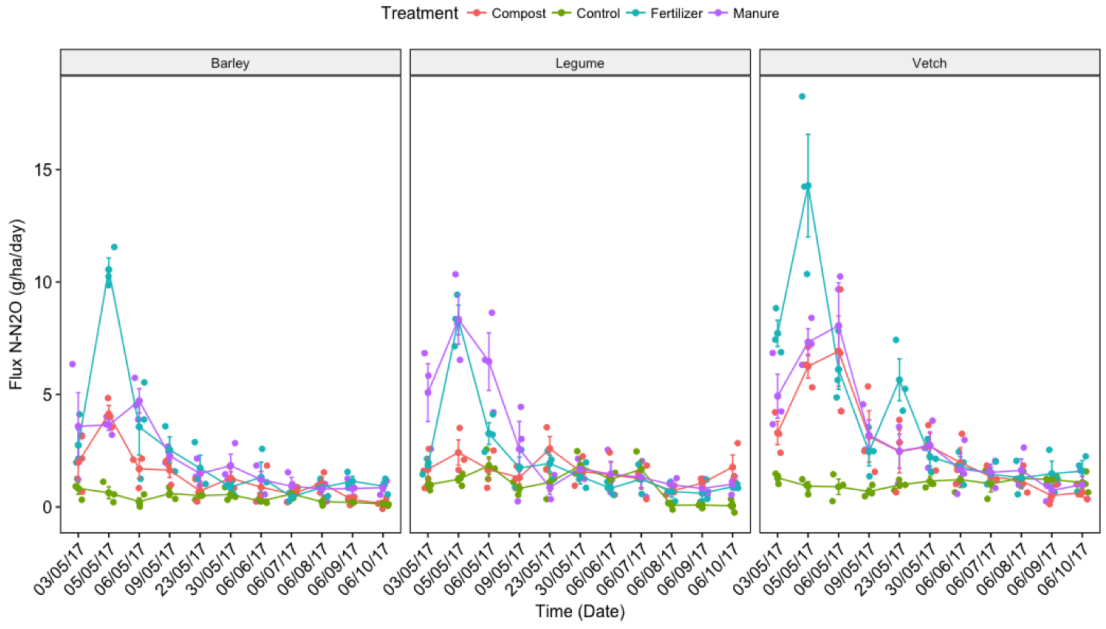
Intensive livestock production and urban wastes generate large amount of wastes which are composted and typically reused as fertilizers in agricultural ecosystems. In Cyprus, application of manure and chemical fertilizers often results in high nitrogen inputs generating a surplus of available nitrogen that can stimulate large nitrous oxide emissions. On the contrary, composted material doesn't increase N soil content however increases organic C thereby improving soil structure and functioning. The present study, included barley, vetch and pea production fields. Livestock manure, compost, ammonium nitrate was applied in a split-plot experimental design and compared to non-treated controls. Nitrogen inputs, N_2O emissions, crop N content and soil available nitrogen were assessed over two growing seasons. N_2O emission was significantly affected by type of nutrient management scheme, crop type and year. The emission factors in the different systems were between 0.07 and 0.24% and this was associated with the environmental conditions and particularly soil moisture. The variability of N_2O fluxes and the cumulative N-N_2O emissions was likely due to differences in nitrogen inputs and agricultural system management. The higher cumulative N-N_2O emissions were recorded in chemical fertilized plots in all crops followed by manure and compost. Under control conditions, the highest emission was noticed in vetch followed by pea and barley. This study showed that the use of organic amendments in agricultural systems reduces N_2O emissions under semi-arid conditions.

Figure 1. Nitrous oxide fluxes (g/ha/day) recorded from different nutrient management schemes in barley, vetch and pea. Vertical bars represent standard error of the mean.



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