

## **Abstract**

The response of nitrous oxide emission and nitrate leaching to increased nitrogen (N) fertiliser and cattle manure applications to wetland vegetable cropping in subtropical Africa have significant impacts on the atmospheric and terrestrial environments. Two field experiments were carried out in a wetland in central Zimbabwe in order to determine the effects of N fertiliser and cattle manure applications on emissions of N<sub>2</sub>O, nitrate leaching and dry matter yield of rape and tomato. The static chamber and gas chromatography techniques were used to capture and measure fluxes of N<sub>2</sub>O. A station of buried lysimeters was employed to collect leachate for determining nitrate leaching losses. The experiments were in completely randomised block designs. The loss of N in nitrate leaching increased significantly with increasing rates of manure and mineral fertiliser applications. When the application rates of N fertiliser and manure were increased, the emissions of N<sub>2</sub>O per unit harvested dry matter yield significantly decreased. Losses of N in N<sub>2</sub>O emissions can be reduced by adopting agronomic practices that enhance N uptake and higher dry matter yield. The loss of N from applied fertilisers in nitrate leaching was 6–20 times greater than the loss of N in N<sub>2</sub>O emissions in wetland vegetable production.