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Influence of slurry and mineral fertiliser application technique on N_2O and CH4 fluxes from a barley field

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Nitrous oxide (N2O) and methane (CH4) are greenhouse gases influencing on global warming and destruction of ozone layer (Houghton et al., 2001; Crutzen, 1981). The application of livestock manure and mineral fertilisers is an important source of greenhouse gases in agriculture (Bouwman, 1996; Mosier et al, 1998). The emissions of N2O originate from nitrification and denitrification processes which are strongly influenced by soil temperature, moisture, pH and availability of soluble organic matter (Granli & Bøckman, 1994). Currently, there is lack of knowledge about the effect of different application techniques on fluxes from agricultural soils.

In this study, the effects of different application techniques on emissions of these gases from a barley field were compared. During a five-month period, slurry injection in combination with sowing produced the most N2O, cumulative N2O flux (□SE) being 1100□169 g N ha-1. When slurry was injected and mineral fertiliser placed in combination with sowing, the cumulative N2O emissions were 660□70 g N ha-1. Cumulative N2O flux was 400□37 g N ha-1 from slurry incorporated one hour after band spreading followed by combined placement of mineral fertiliser and sowing. N2O emissions were the lowest (290□27 g N ha-1) when mineral fertiliser without slurry was placed in combination with sowing. The proportion of applied N lost as N2O during the five-month period was the highest (0.8%) in the treatment where only slurry was injected, and the lowest (0.3%), when mineral fertiliser was placed. Cumulative CH4 fluxes ranged from -290 g ha-1 to 50 g ha-1 in the treatments and no significant effect of the application technique was detected. The results suggest that separate emission factors should be developed for N2O emissions resulting from different application techniques.

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