GENERAL INFORMATION

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ABSTRACT

In a first experiment, the effect of land use on the uptake rate of atmospheric CH_4 was studied in laboratory incubations of intact soil cores. A soil under deciduous forest showed the highest CH_4 oxidation. Its overall CH_4 uptake during the measuring period (202 days) was 1.03 kg CH_4 ha^{-1}. Natural grassland showed the second highest CH_4 oxidizing capacity (0.71 kg CH_4 ha^{-1}). The overall amount of CH_4 uptake by fertilized pasture was 0.33 kg CH_4 ha^{-1}. CH_4 oxidation in arable soils with different fertilizer treatments varied between 0.34 and 0.37 kg CH_4 ha^{-1}. Undisturbed soils had a higher CH_4 uptake capacity than agricultural soils. The moisture content of the soil was found to be an important parameter explaining temporal variations of CH_4 oxidation. Different methods of fertilization which had been commenced 10 years previously were not yet reflected in the total CH_4 uptake rate of the arable soil. In a second experiment, a number of frequently used pesticides were screened for their possible effect on CH_4 oxidation. In a sandy arable soil lenacil, Mikado and oxadixyl caused significantly reduced CH_4 oxidation compared to the control. Under the same conditions, but in a clayey arable soil, mikado, atrazine and dimethenamid caused a reduction of the CH_4 uptake. In a landfill cover soil, with a 100-fold higher CH_4 oxidation rate, no inhibition of CH_4 oxidation was observed, not even when the application rate of pesticides was tenfold higher than usual.

MATERIALS & METHODS

study area	
time period	5 August 1996 – 27 February 1997
goal	Study the effect of land use and pesticides on CH4 oxidation in some Belgian soils.
set-up	a deciduous forest, an unfertilized natural grassland in a nature reserve, a fertilized pasture, 4 maize fields with different fertilizer applications: lab incubation of 4 soil cores per site 3 soil types (sandy & clayey arable soil, sandy loam landfill cover soil): impact of 6 herbicides at 20°C (and 10°C for the landfill cover soil)
data collection	lab incubation: CH_4 uptake rate, NO_2 flux, soil moisture
remarks	

RESULTS

Oxidation rates were significantly higher in the forest and natural grassland soils probably because of the N turnover, C availability and the degree of soil disturbance. The temporal variability of the CH_4 oxidation rates can be explained by soil moisture and temperature changes. Decreased soil temperature had only a minor effect on the CH_4 uptake rates. Methanotrophic activity is influenced more by moisture than by temperature changes.

In the sandy soil all pesticide treatments showed reduced CH_4 oxidation. However, only lenacil, mikado and oxadixyl gave a statistically significant reduction. In the clayey soil, the CH_4 uptake was reduced significantly by atrazine, dimethenamid and mikado. The other pesticides tested also tended to decrease CH_4 oxidation but, except for atrazine and dimethenamid, to a lesser extent than in the sandy soil. When the same soils were incubated at 10°C no adverse effect of the pesticides was found, even not with a tenfold application rate.