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## **Manure distribution as a predictor of N<sub>2</sub>O emissions from soil**

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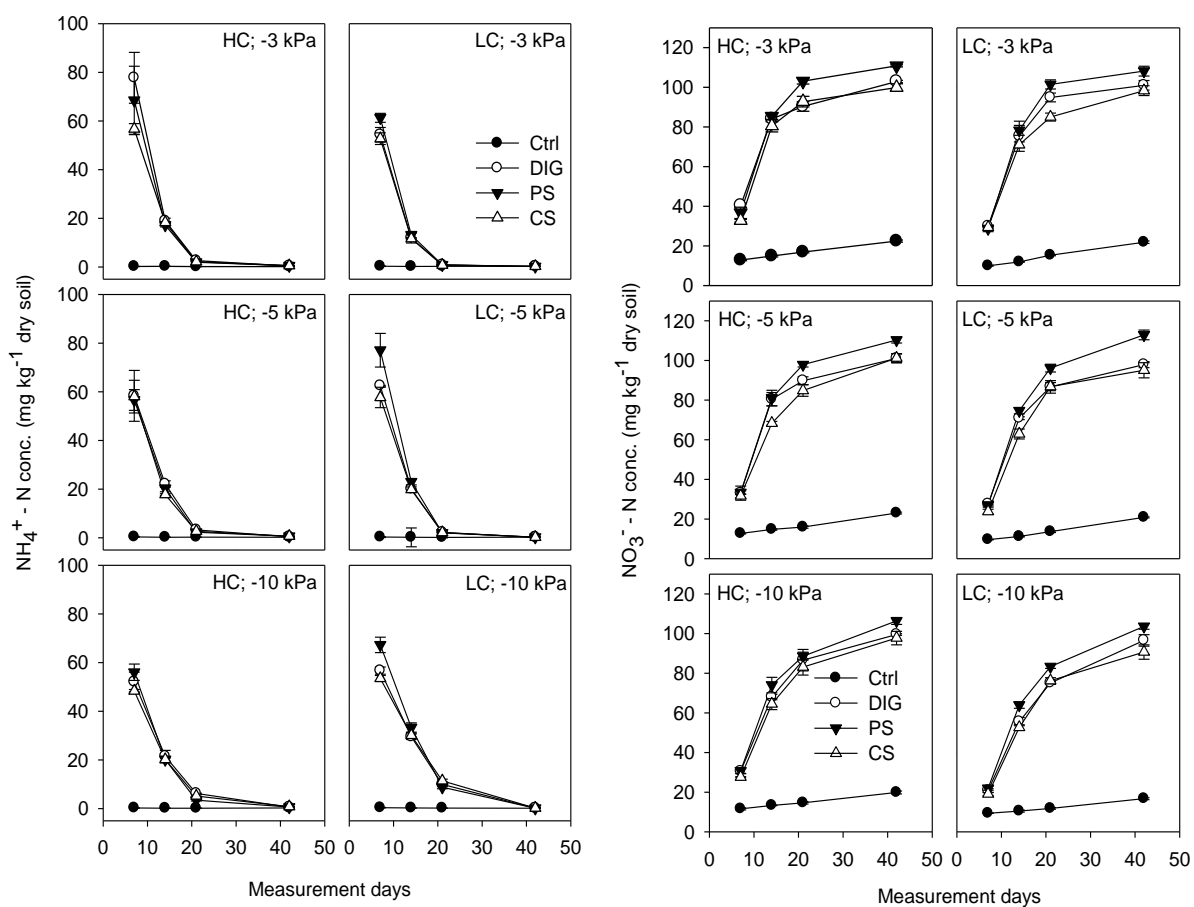


Figure S1. Soil ammonium ( $\text{NH}_4^+$ -N), left panel, and nitrate ( $\text{NO}_3^-$ -N), right panel, concentrations in the soil content 21% clay (HC) and 10% clay (LC). Data points show means and error bars denote the standard error (n=3). -3 kPa, -5 kPa and -10 kPa represent water matric potentials. Ctrl, control; DIG, digestate; PS, pig slurry and CS, cattle slurry.

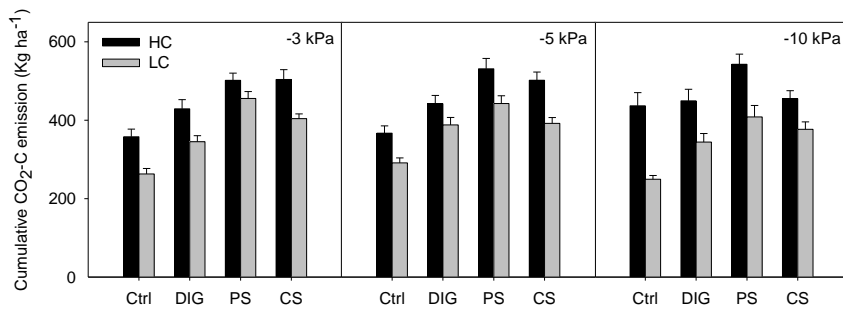


Figure S2. Cumulative emissions of CO<sub>2</sub>-C from slurry amended and control treatments. Data points show means and error bars denote propagated standard error. HC and LC represent, respectively, soil with 21% clay and 10% clay. -3 kPa, -5 kPa and -10 kPa represent water matric potentials. Ctrl, control; DIG, digestate; PS, pig slurry and CS, cattle slurry.

Table S1. Total and air-filled porosity for each of the 18 treatments with manure amendment, relative gas diffusivity (RD) calculated according to Moldrup *et al.* (2005), and  $f_D$  calculated according to Eq. 5.

		7.5% clay			17% clay		
		-0.01MPa	-0.005 MPa	-0.003 MPa	-0.01MPa	-0.005 MPa	-0.003 MPa
	Porosity	0.51					
Digestate	vol.of air (m3/m3)	0.31	0.26	0.21	0.23	0.21	0.19
	RD	0.109	0.072	0.042	0.053	0.041	0.032
	$f_D$	0.00084	0.00195	0.00556	0.004	0.006	0.010
Pig slurry	vol.of air (m3/m3)	0.31	0.26	0.21	0.23	0.21	0.19
	RD	0.103	0.067	0.040	0.048	0.038	0.030
	$f_D$	0.00094	0.00220	0.00632	0.004	0.007	0.011
Cattle slurry	vol.of air (m3/m3)	0.31	0.27	0.21	0.23	0.21	0.19
	RD	0.110	0.072	0.043	0.053	0.041	0.033
	$f_D$	0.00083	0.00193	0.00550	0.004	0.006	0.009

Table S2. The fraction of manure liquid phase retained by manure volatile solids,  $f_R$ , was estimated by an iterative procedure using Eq. 1. According to these estimates the pig slurry, retained less of the liquid phase than cattle slurry or digestate, i.e., 2-3 times more of the liquid was absorbed by the soil in response to the water potential gradient when applying pig slurry.

		7.5% clay			17% clay		
		-0.01MPa	-0.005 MPa	-0.003 MPa	-0.01MPa	-0.005 MPa	-0.003 MPa
Digestate		0.703	0.789	0.822	0.640	0.758	0.806
Pig slurry		0.401	0.534	0.591	0.354	0.499	0.569
Cattle slurry		0.723	0.807	0.839	0.658	0.776	0.823