

Supplementary Materials

Table S1: Geographic locations of the study sites

Site	Coordinates (Lat, Long)	Height a.s.l. [m]
Berge	52.62 N, 12.78 E	40
Dedelow	53.37 N, 13.83 E	34
Hohenschulen	54.31 N, 9.99 E	30
Ihinger Hof	48.74 N, 8.92 E	479
Merbitz	51.62 N, 11.91 E	153

Table S2: Dates of WOSR sowing and WOSR harvest for the five studied sites and the three investigated cropping periods.

Site	Cropping period	Sowing date	Fertilization (1 st /2 nd split)	Harvest date	—
Berge	2012/2013	10.09.2012	04.04./02.05.2013	01.08.2013	
	2013/2014	05.09.2013	19.02./09.04.2014	16.07.2014	
	2014/2015	03.09.2014	17.02./24.03.2015	28.07.2015	
Dedelow	2012/2013	20.08.2012	05.03./17.04.2013	01.08.2013	
	2013/2014	26.08.2013	11.03./11.03.2014	18.07.2014	
	2014/2015	25.08.2014	03.03./24.03.2015	31.07.2015	
Hohenschulen	2012/2013	29.08.2012	04.04./23.04.2013	05.08.2013	
	2013/2014	28.08.2013	12.03./01.04.2014	19.07.2014	
	2014/2015	27.08.2014	17.03./08.04.2015	04.08.2015	
Ihinger Hof	2012/2013	28.08.2012	13.03./15.04.2013	02.08.2013	
	2013/2014	24.08.2013	25.02./24.03.2014	18.07.2014	
	2014/2015	23.08.2014	09.03./13.04.2015	21.07.2015	
Merbitz	2012/2013	29.08.2012	09.04./02.05.2013	26.07.2013	
	2013/2014	21.08.2013	10.03./08.04.2014	16.07.2014	
	2014/2015	20.08.2014	10.03./08.04.2015	22.07.2015	

Table S3: Main characteristics of the digestates used at the five study sites

Site	Year	Substrate before digestion	DM [%]	N _{total} [%]	NH ₄ -N [%]
Berge	2013	cattle slurry/maize/grass silage	8.4	0.6	0.4
	2014		9.2	0.5	0.2
	2015		10.5	0.5	0.2
Dedelow	2013	cattle slurry/maize silage	6.0	0.3	0.1
	2014		6.1	0.3	0.2
	2015		7.8	0.5	0.2
Hohenschulen	2013	cattle slurry/maize silage	6.8	0.4	0.3
	2014		7.1	0.5	0.3
	2015		8.1	0.5	0.3
Ihinger Hof	2013	pig slurry/maize/grass silage	8.9	0.5	0.3
	2014		10.1	0.6	0.3
	2015		8.7	0.6	0.4
Merbitz	2013	cattle slurry/maize silage	5.2	0.3	0.2
	2014		5.1	0.3	0.2
	2015		5.0	0.3	0.2

Table S4: Values of statistical criteria used to evaluate the SMN submodel relative to observations of SMN (0-30 cm) (For a more detailed presentation see Rübiger et al. (2020))

Site	Parameter	Observations	r ²	slope	intercept	RMSE kg N ha ⁻¹
Berge	SMN 0-30	768	0.15 (0.13 -0.22)	0.30	26.0	33.62
Dedelow	SMN 0-30	838	0.43 (0.41-0.59)	0.76	12.3	31.42
Hohenschulen	SMN 0-30	697	0.53 (0.40-0.74)	0.76	6.8	13.04
Ihinger Hof	SMN 0-30	681	0.32 (0.20-0.48)	0.39	16.6	26.52
Merbitz	SMN 0-30	963	0.48 (0.50-0.54)	0.68	18.2	21.96

Table S5: Values of statistical criteria used to evaluate the simulation of soil water content by PSAM (For a more detailed presentation see Rübiger et al. (2020))

Site	Parameter	Observations	r ²	slope	intercept	RMSE cm ³ cm ⁻³
Berge	WC 0-30	800	0.39 (0.32-0.59)	0.435	0.12	0.06
Dedelow	WC 0-30	852	0.72 (0.58-0.82)	0.818	0.05	0.03
Hohenschulen	WC 0-30	704	0.51 (0.44-0.64)	0.677	0.06	0.04
Ihinger Hof	WC 0-30	689	0.45 (0.37-0.60)	0.371	0.22	0.05
Merbitz	WC 0-30	988	0.62 (0.37-0.83)	0.623	0.14	0.05

Reference

Räbiger T, Andres M, Hegewald H, et al (2020) Indirect nitrous oxide emissions from oilseed rape cropping systems by NH₃ volatilization and nitrate leaching as affected by nitrogen source, N rate and site conditions. Eur J Agron 116:126039. <https://doi.org/10.1016/j.eja.2020.126039>