Supplementary materials

Figure S1 NH_3 emissions after fertilization with different treat after fertilization

Table S1 Volume, NO_3^--N and NH_4^+-N concentration of leaching solution

Table S2 Annual NH_3 emissions, N leaching and NUE

Table S3 Soil characteristics of after the second year of experiment (0-20 cm)

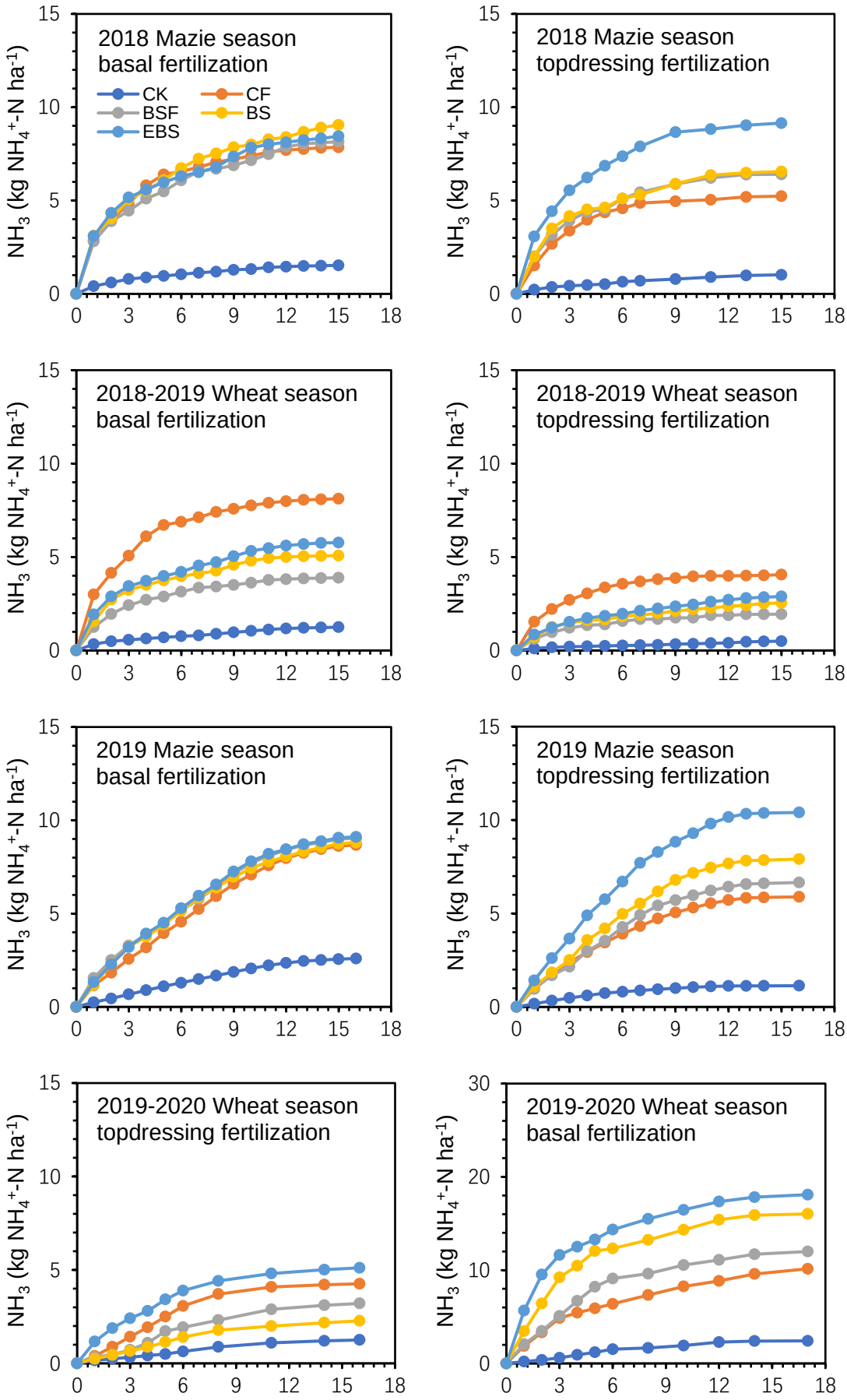

Figure S1 NH_3 emissions after fertilization with different treat after fertilization

Table S1 Volume, NO_3^--N and $NH4^+$-N concentration of leaching solution

		First			Second			Third			Fourth		
		Volume L	NO_3^--N mg L^{-1}	NH_4^+-N mg L^{-1}	Volume L	NO_3^--N mg L^{-1}	NH_4^+-N mg L^{-1}	Volume L	NO_3^--N mg L^{-1}	NH_4^+-N mg L^{-1}	Volume L	NO_3^--N mg L^{-1}	NH_4^+-N mg L^{-1}
2018 Maize season	CK	33.4	20.1	1.16	32.4	6.53	0.65	43.0	11	1.22	34.8	9.96	0.68
		34.3	45	0.39	32.2	25.8	0.41	27.0	42.9	0.9	29.6	6.95	0.51
		32.3	63.4	1.18	26.9	36.5	1.65	32.2	28.98	0.95	33.1	5.17	1.1
	CF	30.5	65.7	2.36	23.7	64.6	3.87	34.1	34.5	3.99	33.9	26.1	0.11
		31.3	123.3	0.92	17.4	92.4	1.08	19.1	61.5	1.48	32.3	38.2	0.33
		29.6	23.1	0.94	14.6	20.3	4.51	33.6	22.4	1.74	32.7	16.4	0.15
	BSF	31.3	49.3	3.07	31.6	44.8	5.24	29.5	25.4	3.47	34.2	22.5	1.1
		27.3	108.9	2.29	33.1	80.2	2.12	20.5	32.3	2.35	37.4	41.1	1.23
		33.1	39.1	1.17	21.6	16.5	1.87	33.6	12.3	1.03	32.6	22.2	1.12
	BS	24.9	39.8	9.52	33.6	30.4	7.02	30.6	22.3	5.27	34.6	52.3	3.23
		34.5	128.6	5.96	32.3	63.3	4.17	31.6	38.4	5.15	33.3	30.5	1.45
		34	64.6	1.11	23.7	43.9	4.97	33.9	42.5	5.25	34.2	26.8	0.57
	EBS	25.8	132.1	2.85	22.9	104.3	4.07	30.9	65.3	5.28	24.8	44.1	0.62
		25.1	81.6	3.28	21.6	69.1	3.04	30.6	75.5	3.48	30.3	35.4	1.06
		36	61.3	7.01	22.7	33.3	5.08	18.7	15.4	5.15	34.6	30.7	1.21
2018-2019 Wheat season	CK	34	18.9	0.54	25.2	8.16	0.4	27.5	1.59	0.47			
		30.2	37.1	0.61	28.2	19.5	0.45	32.2	6.56	0.6			
		32.1	39.3	0.34	24.6	13.4	0.05	34.1	5.22	0.54			
	CF	29.6	76.5	1.25	30.5	48.5	1.75	29.1	12.3	0.26			
		33.1	37.8	0.12	29.9	28.9	0.15	32.1	13	0.1			
		30.4	20.4	0.11	32.0	19.5	0.05	34.3	9.8	0.03			
	BSF	34.1	130.7	7.48	30.1	87.2	4.25	30.8	32.5	1.28			
		31.5	59.5	1.32	28.6	48.3	1.87	30.6	19.1	0.42			
		30.2	25.1	2.21	29.4	13.2	1.92	33.2	10.4	0.62			

	BS	32.3	150.2	9.96	31.2	98.9	7.28	34.9	26.1	1.37
		35.6	62.1	2.32	30.4	44.8	2.42	33.9	17.7	1.29
		32.4	22.2	14.6	29.6	15.4	9.52	30.9	19.1	1.31
	EBS	31.2	116.3	7.22	33.1	87.8	4.58	30.6	16.5	1.52
		30	226.8	2.71	29.8	143.6	2.51	28.7	27.2	1.37
		32.7	15	16.3	28.7	10.3	6.4	33.6	10.61	1.05
	CK	25.5	1.71	1.14	34.0	1.18	0.27	5.5	1.34	0.37
		30.0	2.21	0.95	30.5	1.34	0.75	6.0	0.45	0.48
		21.0	3.34	1.08	32.0	0.91	0.43	3.5	1.02	0.43
	CF	22.5	17.8	0.45	40.0	10.9	0.28	3.2	10.7	0.19
		32.0	13.3	0.29	32.5	11.4	0.24	4.0	2.58	0.15
		26.5	18.2	0.35	40.0	6.9	0.21	4.5	8.24	0.22
2019 Maize season	BSF	24.4	11.9	0.25	34.0	5.08	0.32	3.5	10.9	0.2
		20.5	17.6	0.24	40.0	6.7	0.27	6.0	7.9	0.33
		21.0	12.4	0.28	33.4	10.14	0.21	2.5	5.59	0.5
	BS	21.6	12.1	0.89	33.0	4.39	0.37	3.5	5.3	0.28
		31.0	9.23	0.61	24.0	7.02	0.21	4.5	6.72	0.21
		24.0	12.3	0.81	28.0	5.04	0.19	4.0	7.87	0.23
	EBS	13.0	23.4	7.74	33.0	12.2	4.26	5.5	5.68	1.28
		20.0	10.5	6.48	20.5	9.93	5.22	4.0	6.25	1.15
		16.5	18.8	8.86	30.0	7.65	3.18	3.0	8.32	0.87
	CK	30.2	8.56	0.81	30.0	5.8	0.82			
		22.8	0.98	1.1	19.0	1.7	0.19			
2019-2020 Wheat season		25.6	0.07	0.04	23.0	0.07	0.05			
	CF	33.5	79	0.21	35.2	12.5	0.43			
		32.0	79.7	0.68	33.0	16.2	0.18			
		21.1	8.85	0.37	16.5	2.3	0.09			
	BSF	29.4	18.6	0.16	29.1	16.5	0.11			

	25.4	33.8	0.18	23.1	18.3	0.19
	26.8	45.8	0.16	25.2	16.2	0.17
BS	30.1	15.5	0.15	30.1	15.1	0.12
	28.3	11.2	0.28	27.4	6.2	0.18
	28.0	8.48	0.21	27.0	17.3	0.15
EBS	27.5	18.3	0.12	26.2	12.6	0.26
	28.0	58.8	0.88	27.0	9.8	0.37
	28.5	31.5	0.44	27.7	10.8	0.34

Note: Four leachate samples were taken during the 2018's Maize season, three leachate samples were taken during the 2018-2019 Wheat season, and two leachate samples were taken during the 2019-2020 Wheat season.

Table S2 Annual NH_3 emissions, N leaching and NUE

	Treatment	2018-2019	2019-2020	Average
NH_3 emissions kg N ha^{-1}	CK	4.29	7.40	5.84
	CF	25.26	28.97	27.11
	BSF	20.39	30.90	25.64
	BS	23.23	35.02	29.12
	EBS	26.25	42.72	34.48
N leaching kg N ha^{-1}	CK	48.45	3.42	25.93
	CF	81.85	30.27	56.06
	BSF	99.24	19.95	59.59
	BS	119.69	12.35	66.02
	EBS	141.35	22.04	81.69
N losses kg N ha^{-1}	CK	52.74	10.82	31.77
	CF	107.11	59.24	83.17
	BSF	119.63	50.86	85.24
	BS	142.92	47.37	95.14
	EBS	167.60	64.76	116.18
NUE %	CF	29.33	49.13	39.23
	BSF	29.01	48.11	38.56
	BS	33.48	50.15	41.82
	EBS	19.56	28.63	24.09

Table S3 Soil characteristics of after the second year of experiment (0-20 cm)

Treatment	pH	Organic matter ($g \cdot kg^{-1}$)	Total nitrogen ($g \cdot kg^{-1}$)	C/N
CK	8.74±0.14a	19.1±0.30b	0.95±0.32b	11.6
CF	8.71±0.16a	18.9±2.28b	1.14±0.06ab	9.53
BSF	8.71±0.10a	24.3±4.47ab	1.21±0.19a	11.6
BS	8.87±0.13a	25.1±6.74ab	1.28±0.18a	11.3
EBS	8.90±0.15a	26.4±3.82a	1.31±0.32a	11.6

The different lowercase letters are significantly different at $P < 0.05$.