

Appendix B Dataset of this meta-analysis

Title: Patterns of crop-specific fertilizer-nitrogen losses and opportunities for sustainable mitigation:

A quantitative overview of ^{15}N -tracing studies

Running title: Global patterns and mitigation potential of crop-specific fertilizer-N losses

Authors:

Cong Xu^{a,b,†}, Hanshen Zhu^{a,b,†}, Haokuang Liu^{a,b}, Cheng Ji^{a,b}, Jie Yuan^a, Guanlin Li^b, Jidong Wang^{a,b*},
Yongchun Zhang^{a,b*}

^a *National Agricultural Experimental Station for Agricultural Environment, Luhe, Institute of Agricultural Resources and Environment, Jiangsu Academy of Agricultural Sciences, Nanjing 210014, China*

^b *School of the Environment and Safety Engineering, Jiangsu University, Zhenjiang 212013, China*

[†] These authors contributed equally to this work.

***Corresponding Author:**

Jidong Wang, No. 50 Zhonglingjie Street, Jiangsu Academy of Agricultural Sciences, Nanjing 210014, Jiangsu, China; jidongwang@jaas.ac.cn

Yongchun Zhang, No. 50 Zhonglingjie Street, Jiangsu Academy of Agricultural Sciences, Nanjing 210014, Jiangsu, China; yczhang66@sina.com

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Aulakh, M. S.	2017	Ludhiana, India	30.55	75.51	24.0	466	loamy sandy	8.10	3.00	0.67	Wheat	120		43.00	49.00	8.00
Aulakh, M. S.	2017	Ludhiana, India	30.55	75.51	24.0	466	loamy sandy	8.10	3.00	0.67	Wheat	150		39.00	43.00	18.00
Aulakh, M. S.	2017	Ludhiana, India	30.55	75.51	24.0	466	loamy sandy	8.10	3.00	0.67	Wheat	120		47.00	48.00	5.00
Aulakh, M. S.	2017	Ludhiana, India	30.55	75.51	24.0	466	loamy sandy	8.10	3.00	0.67	Wheat	150		40.00	39.00	21.00
Baker, J. L.	1994	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200		35.20	23.10	41.70
Baker, J. L.	1994	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200		44.20	22.40	33.40
Baker, J. L.	1994	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200		37.90	23.60	38.50
Baker, J. L.	1994	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	75		51.50	24.30	24.20
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandyloam	8.40	4.20	0.42	Rice	60	4030	24.40	25.30	50.30
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandyloam	8.40	4.20	0.42	Rice	120	4310	18.70	23.50	57.80
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandyloam	8.40	4.20	0.42	Rice	180	3780	16.10	20.90	63.00

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandy loam	8.40	4.20	0.42	Rice	60	4470	22.60	36.70	40.70
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandy loam	8.40	4.20	0.42	Rice	120	4480	30.70	24.30	45.00
Bandyopadhyay, K. K.	2005	New Delhi, Indian	28.37	77.13	24.5	514	sandy loam	8.40	4.20	0.42	Rice	180	3780	23.20	21.20	55.60
Cai, G. X.	1998	Henan, China	35.10	114.40	13.9	615	sandy loam	8.80		0.55	Wheat	75		18.20	60.20	21.60
Cai, G. X.	1998	Henan, China	35.10	114.40	13.9	615	sandy loam	8.80		0.55	Wheat	75		19.70	50.80	29.50
Cai, G. X.	2002	Henan, China	35.10	114.40	13.9	615	sandy loam	8.60	10.35	0.63	Maize	200		28.00	62.00	10.00
Cai, G. X.	2002	Henan, China	35.10	114.40	13.9	615	sandy loam	8.60	10.35	0.63	Maize	200		24.20	8.80	67.00
Cao, Y. S.	2018	Shanghai, China	31.41	121.49	15.8	1178	silty loam	7.60	13.75	1.40	Rice	225	8260	20.30	24.60	55.10
Chen, H. H.	2021	Jilin, China	43.31	124.34	6.9	614	silty loam	7.10	11.30	1.20	Maize	240		48.05	34.83	33.14
Chen, H. H.	2021	Jilin, China	43.31	124.34	6.9	614	silty loam	7.10	11.30	1.20	Maize	240		45.92	36.56	42.34
Chen, H. H.	2021	Jilin, China	43.31	124.34	6.9	614	silty loam	7.10	11.30	1.20	Maize	240		52.04	32.98	14.93

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Chen, H. H.	2021	Jilin, China	43.31	124.34	6.9	614	siltyloam	7.10	11.30	1.20	Maize	240		50.48	32.55	23.18
Chen, H. H.	2021	Jilin, China	43.31	124.34	6.9	614	siltyloam	7.10	11.30	1.20	Maize	240		52.61	35.26	9.79
Fan, M. S.	2007	Sichuan, China	30.42	103.50	18.0	947	sandyloam	6.60	12.82	1.36	Wheat	120	5918	57.80	26.60	15.60
Fan, M. S.	2007	Sichuan, China	30.42	103.50	18.0	947	sandyloam	6.60	12.82	1.36	Wheat	180	5764	37.70	29.20	33.10
Fan, M. S.	2007	Sichuan, China	30.42	103.50	18.0	947	sandyloam	6.60	12.82	1.36	Rice	119	8560	16.20	10.70	73.10
Fan, M. S.	2007	Sichuan, China	30.42	103.50	18.0	947	sandyloam	6.60	12.82	1.36	Rice	146	6622	7.90	9.00	83.10
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	14546	40.05	15.90	20.60
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	14922	46.19	15.62	23.00
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	14351	47.00	19.16	20.30
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	11590	47.14	32.82	16.40
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	11708	51.24	28.91	5.80
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	11438	49.57	29.07	18.20
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	1183	47.67	42.12	5.10

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
J. L.		Spain					am		0				1			
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	9796	44.71	34.30	0.90
Gabriel, J. L.	2011	Madrid, Spain	40.25	-3.45	16.0	436	siltyloam	8.16	31.80	3.18	Maize	210	8446	40.38	32.02	1.80
Grageda-Cabrera, O. A.	2011	Celaya, Mexico	20.53	-100.81	19.0	610	clayloam	6.70	22.40	2.24	Maize	240		41.20	4.80	54.00
Grageda-Cabrera, O. A.	2011	Celaya, Mexico	20.53	-100.81	19.0	610	clayloam	6.70	22.40	2.24	Maize	240		59.10	9.20	31.70
Grageda-Cabrera, O. A.	2011	Celaya, Mexico	20.53	-100.81	19.0	610	clayloam	6.70	22.40	2.24	Maize	240		27.40	3.40	69.20
Guo, R. Y.	2018	Beijing, China	40.22	116.23	20.7	374	sandyloam		9.74	1.40	Maize	75		13.33	22.58	64.09
Guo, S.	2019	Shanxi, China	35.12	107.40	9.1	580	siltyloam	8.40	7.80	1.02	Maize	260	14200	19.20	26.80	54.00
Guo, S.	2019	Shanxi, China	35.12	107.40	9.1	580	siltyloam	8.40	7.80	1.02	Maize	260	12900	32.80	42.70	24.50
Helena, R.K.	2009	Buenos Aires,	-58.29	-34.36	17.5	810	siltyclayloam	6.00	9.10		Maize	70		43.00	9.00	48.00

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
		Argentina					m									
Helena, R.K.	2009	Buenos Aires, Argentina	-58.29	-34.36	17.5	810	silty loam	6.00	9.10		Maize	140		20.00	20.00	60.00
Helena, R.K.	2009	Buenos Aires, Argentina	-58.29	-34.36	17.5	810	silty loam	6.00	9.10		Maize	70		40.00	9.00	51.00
Helena, R.K.	2009	Buenos Aires, Argentina	-58.29	-34.36	17.5	810	silty loam	6.00	9.10		Maize	140		40.00	8.00	52.00
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.48	6.35	1.33	Wheat	240	4811	37.84	26.05	36.11
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.48	6.35	1.33	Wheat	240	6274	45.57	22.99	31.44
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.48	6.35	1.33	Wheat	240	5448	41.62	24.61	33.77
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.48	6.35	1.33	Wheat	240	6931	48.62	22.46	28.92
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.47	6.59	1.28	Wheat	240	5193	39.10	25.33	35.57
Hu, C.	2019	Jiangsu,	32.04	118.76	15.0	1000	loam	7.47	6.59	1.28	Wheat	240	6719	46.28	21.92	31.80

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
X.		China														
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.47	6.59	1.28	Wheat	240	6105	42.88	23.53	33.59
Hu, C. X.	2019	Jiangsu, China	32.04	118.76	15.0	1000	loam	7.47	6.59	1.28	Wheat	240	7037	48.26	21.20	30.54
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Maize	150	4330	23.90	55.10	21.00
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Maize	50	3860	64.80	29.60	5.60
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Wheat	90	6810	44.80	31.00	24.20
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Wheat	60	7610	60.80	36.00	3.20
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Maize	150	8980	40.20	36.20	23.60
Jayasundara, S.	2007	Ontario, Canada	43.39	-80.85	3.5	532	siltyloam	7.60	26.90	2.40	Maize	50	8400	57.50	40.70	1.80
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	17150	53.14	12.07	34.79
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	15660	61.77	18.31	19.92
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	17350	55.94	17.78	26.28

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
		China														
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	15470	64.17	25.09	10.74
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	14230	47.46	13.64	38.90
Ji, J. H.	2020	Heilongjiang, China	45.40	126.36	1.5	550	clayloam	6.50	33.10		Maize	280	14380	26.37	42.20	31.43
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	135	7560	20.70	45.40	33.90
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	180	8840	23.70	39.20	37.10
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	225	9400	20.80	37.40	41.80
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	135	8730	26.90	47.40	25.70
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	180	9560	28.90	41.70	29.40
Jiang, C. Q.	2018	Anhui, China	30.69	117.57	16.9	1554	siltyloam	5.70	9.86	0.76	Maize	225	9970	25.70	37.20	37.10
Ju, X. T.	2007	Beijing, China	39.57	119.30	20.7	374	clayloam	7.90	15.48	1.43	Wheat	120	6153	53.90	17.30	28.80
Ju, X.	2007	Beijing,	39.57	119.30	20.7	374	claylo	7.90	15.4	1.43	Wheat	360	5435	32.00	17.50	50.50

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
T.		China					am		8							
Ju, X. T.	2007	Beijing, China	39.57	119.30	20.7	374	clayloam	7.90	15.48	1.43	Maize	120	6021	55.90	23.00	21.10
Ju, X. T.	2007	Beijing, China	39.57	119.30	20.7	374	clayloam	7.90	15.48	1.43	Maize	360	5461	29.60	19.10	51.30
Ju, X. T.	2018	Beijing, China	40.08	116.11	13.0	540	siltysoil				Wheat	325		31.00	45.70	22.20
Ju, X. T.	2018	Beijing, China	40.08	116.11	13.0	540	siltysoil				Maize	263		25.50	33.90	40.10
Ju, X. T.	2018	Jiangsu, China	31.65	120.75	15.5	1038	siltyclayloam				Rice	300		29.60	21.70	48.30
Ju, X. T.	2018	Jiangsu, China	31.65	120.75	15.5	1038	siltyclayloam				Wheat	250		18.40	28.50	49.00
Karlen, D. L.	1996	SC, America	32.45	-79.05	7.3	511	sandyloam	5.60	3.90	0.39	Maize	168		41.80	21.50	36.70
Karlen, D. L.	1996	SC, America	32.45	-79.05	7.3	511	sandyloam	5.60	3.90	0.39	Wheat	168		38.70	21.20	40.10
Karlen, D. L.	1996	SC, America	32.45	-79.05	7.3	511	sandyloam	5.60	3.90	0.39	Maize	168		38.50	14.50	47.00
Karlen, D. L.	1996	SC, America	32.45	-79.05	7.3	511	sandyloam	5.60	3.90	0.39	Wheat	168		29.90	19.60	50.50
Kramer, A. W.	2002	CA, America	37.30	119.20	15.2	563	siltyloam				Maize	220		40.10	15.00	44.90
Kramer, A. W.	2002	CA, America	37.30	119.20	15.2	563	siltyloam				Maize	220		29.30	26.60	44.10

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	90	8309	36.90	27.50	35.60
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	150	9211	35.20	24.30	40.50
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	210	9461	35.60	20.50	43.90
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	270	9291	45.20	7.50	47.30
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	90	7896	30.30	28.60	41.10
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	150	8250	32.10	24.50	43.40
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	210	8685	42.60	9.50	47.90
Li, J. H.	2015	Heilongjiang, China	45.34	131.01	4.2	525	silty clay loam	6.02	18.06	1.81	Rice	270	8616	40.40	8.70	50.90
Liang,	2015	Shanxi,	34.17	108.00	13.0	620	sandy	8.01	7.50	0.90	Wheat	165	1300	19.80	70.10	10.10

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
B.		China					loam									
Liang, B.	2015	Shanxi, China	34.17	108.00	13.0	620	sandy loam	7.82	9.20	1.10	Wheat	165	7500	58.40	36.30	5.30
Liang, B.	2015	Shanxi, China	34.17	108.00	13.0	620	sandy loam	7.72	13.20	1.40	Wheat	165	11400	64.70	26.30	9.00
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Wheat	270	7500	35.10	26.80	38.10
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Wheat	210	7200	49.30	23.80	26.90
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Wheat	210	7300	50.30	23.00	26.70
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Wheat	210	7100	47.80	22.80	29.40
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Maize	240	9600	33.30	21.70	45.00
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Maize	210	9500	30.50	24.50	45.00
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Maize	210	9900	14.10	11.90	74.00
Liang, H. Y.	2020	Shanxi, China	34.36	108.52	12.0	332	loam	8.60	10.95	1.54	Maize	210	9500	16.10	14.10	69.80
Liu, X. W.	2017	Anhui, China	31.03	114.47	15.4	1328	clay loam	6.50	10.09	2.08	Rice	225	8700	11.96	15.02	73.02
Liu, X. W.	2017	Anhui, China	31.03	114.47	15.4	1328	clay loam	6.50	10.09	2.08	Rice	225	8900	42.49	27.78	29.73

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Ma, Q. J.	2018	Gansu, China	35.54	104.05	6.6	382	siltyloam	8.00	10.70	0.93	Maize	138	2150	13.50	45.71	40.79
Ma, Q. J.	2018	Gansu, China	35.54	104.05	6.6	382	siltyloam	8.00	10.70	0.93	Maize	138	7650	20.70	65.64	13.66
Ma, Q. J.	2018	Gansu, China	35.54	104.05	6.6	382	siltyloam	8.00	10.70	0.93	Maize	207	2340	11.20	21.28	67.52
Ma, Q. J.	2018	Gansu, China	35.54	104.05	6.6	382	siltyloam	8.00	10.70	0.93	Maize	207	8860	19.80	56.64	23.56
Maddux, L. D.	1991	MN, America	49.23	-93.15	5.1	693	siltyloam				Maize	180	9000	38.60	39.80	21.60
Maddux, L. D.	1991	MN, America	49.23	-93.15	5.1	693	siltyloam				Maize	180	10000	61.30	25.40	13.30
Maddux, L. D.	1991	MN, America	49.23	-93.15	5.1	693	siltyloam				Maize	180	11000	43.90	24.30	31.80
Maddux, L. D.	1991	MN, America	49.23	-93.15	5.1	693	siltyloam				Maize	180	14000	68.00	21.40	10.60
Mapiki, A.	1993	Kasama, Zambia	-10.14	31.12	19.9	1343	sandyloam	4.00	8.90	0.60	Maize	40		35.00	35.00	24.30
Mapiki, A.	1993	Kasama, Zambia	-10.14	31.12	19.9	1343	sandyloam	4.00	8.90	0.60	Maize	80		30.00	25.00	51.26
Mapiki, A.	1993	Kasama, Zambia	-10.14	31.12	19.9	1343	sandyloam	4.00	8.90	0.60	Maize	120		30.00	20.00	52.66
Migliorati, M. D. A.	2014	Brisbane, Australia	-28.00	154.00	17.5	776	clayloam	5.58	14.50	1.60	Wheat	160		49.70	35.90	14.40

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Norman d, B.	1997	Grenoble, France	40.12	-75.05	13.5	613	sandy loam	7.00	25.70	1.20	Maize	20		66.00	18.10	15.90
Norman d, B.	1997	Grenoble, France	40.12	-75.05	13.5	613	sandy loam	7.00	25.70	1.20	Maize	100		64.80	32.10	3.10
Norman d, B.	1997	Grenoble, France	40.12	-75.05	13.5	613	sandy loam	7.00	25.70	1.20	Maize	160		64.60	25.60	9.80
Qi, D, L.	2020	Gansu, China	37.93	102.64	7.8	164	clay loam		9.22	0.55	Maize	200	10707	28.13	44.46	27.41
Qi, D, L.	2020	Gansu, China	37.93	102.64	7.8	164	clay loam		9.22	0.55	Maize	200	9151	26.56	47.66	25.78
Qi, D, L.	2020	Gansu, China	37.93	102.64	7.8	164	clay loam		9.22	0.55	Maize	200	10774	29.01	44.67	26.32
Qi, D, L.	2020	Gansu, China	37.93	102.64	7.8	164	clay loam		9.22	0.55	Maize	200	8228	23.78	41.85	34.37
Qi, D, L.	2020	Gansu, China	37.93	102.64	7.8	164	clay loam		9.22	0.55	Maize	200	8119	22.93	42.19	34.88
Reddy, G. B.	1993	NC, America	35.80	-78.80	15.0	1279	sandy loam	6.00	8.10	0.31	Maize	200		45.30	13.80	40.90
Reddy, G. B.	1993	NC, America	35.80	-78.80	15.0	1279	sandy loam	6.00	8.10	0.31	Maize	150		48.80	30.60	20.60
Reddy, G. B.	1993	NC, America	35.80	-78.80	15.0	1279	sandy loam	6.00	8.10	0.31	Maize	100		53.00	32.60	14.40
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	silty loam	7.70	7.00	0.85	Maize	210	5200	23.00	17.60	59.40
Rees,	1996	Shanxi,	34.30	108.00	12.9	635	silty lo	7.70	7.00	0.85	Maize	210	5240	25.00	31.40	43.60

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
R.M.		China					am									
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Maize	210	3640	27.00	21.30	51.70
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Maize	210	4800	14.00	21.90	64.10
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Maize	210	7730	11.00	45.10	43.90
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Maize	210	4890	22.00	6.40	71.60
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	75	3970	23.00	18.00	59.00
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	75	4230	24.30	32.10	43.60
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	75	4730	26.60	21.70	51.70
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	150	4660	14.00	21.30	64.70
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	150	4600	11.00	45.10	43.90
Rees, R.M.	1996	Shanxi, China	34.30	108.00	12.9	635	siltyloam	7.70	7.00	0.85	Wheat	150	4380	32.00	6.40	61.60
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.50	15.95	1.60	Rice	150	7100	50.00	8.00	42.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.50	15.95	1.60	Rice	150	7700	55.00	3.00	42.00

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.50	15.95	1.60	Rice	150	7800	50.00	10.00	40.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.50	15.95	1.60	Rice	150	7300	48.00	13.00	39.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.50	15.95	1.60	Rice	150	8300	64.00	13.00	23.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.70	14.50	1.45	Rice	150	10500	43.00	12.00	45.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.70	14.50	1.45	Rice	150	8900	38.00	15.00	47.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.70	14.50	1.45	Rice	150	10500	44.00	17.00	39.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.70	14.50	1.45	Rice	150	9700	44.00	18.00	38.00
Reis, A. F. D.	2018	Lagoa, Brazil	-49.55	-10.46	26.7	1800	siltyloam	5.70	14.50	1.45	Rice	150	10600	65.00	22.00	13.00
Rimskov, H.	2012	Buenos Aires, Argentina	-34.20	-58.30	17.7	1215	siltyloam	5.90	14.50		Maize	70		58.98	6.54	34.48
Rimskov, H.	2012	Buenos Aires, Argentina	-34.20	-58.30	17.7	1215	siltyloam	5.90	14.50		Maize	140		56.82	10.94	32.25
Rimskov, H.	2012	Buenos Aires, Argentina	-34.20	-58.30	17.7	1215	siltyloam	5.90	14.50		Maize	250		47.02	10.88	42.09

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Korsakov, H.		Aires, Argentina					am		0							
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		27.12	20.17	52.71
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		32.76	29.50	37.74
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		34.70	33.41	31.89
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		24.96	45.11	29.93
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		31.89	26.68	41.43
Song, J. G.	1999	Shandong, China	36.96	118.10	13.1	411	sandy loam	8.35	8.29	0.90	Wheat	291		34.06	30.37	35.57
Stevens, W. B.	2005	IL, America	47.98	-98.46	11.0	996	silty clay loam				Maize	67		35.00	29.00	36.00
Stevens, W. B.	2005	IL, America	47.98	-98.46	11.0	996	silty clay loam				Maize	134		31.00	40.00	29.00
Stevens, W. B.	2005	IL, America	47.98	-98.46	11.0	996	silty clay loam				Maize	201		37.00	28.00	35.00
Stevens, W. B.	2005	IL, America	47.98	-98.46	11.0	996	silty clay loam				Maize	268		34.00	33.00	33.00
Sui, C. L.	2014	Shandong, China	36.19	117.14	15.1	697	silty loam	5.85	6.73	1.13	Maize	379	15168	28.30	34.53	37.17

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Sui, C. L.	2014	Shandong, China	36.19	117.14	15.1	697	siltyloam	5.85	6.73	1.13	Wheat	212	8976	7.28	56.65	36.07
Timmons, D. R.	1990	IA, America	38.05	-81.05	12.5	779	loam				Maize	224	7200	59.00	16.00	25.00
Timmons, D. R.	1990	IA, America	38.05	-81.05	12.5	779	loam				Maize	224	7200	65.00	17.00	18.00
Timmons, D. R.	1990	IA, America	38.05	-81.05	12.5	779	loam				Maize	224	5200	65.00	18.00	17.00
Timmons, D. R.	1990	IA, America	38.05	-81.05	12.5	779	loam				Maize	224	4000	57.00	16.00	27.00
Timmons, D. R.	1992	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200	7290	36.00	23.10	40.90
Timmons, D. R.	1992	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	75	7290	57.60	24.30	18.10
Timmons, D. R.	1992	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200	7010	46.90	22.40	30.70
Timmons, D.	1992	IA, America	38.05	-81.05	8.8	864	siltyloam				Maize	200	7130	42.20	23.60	34.20

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
R.																
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		41.73	20.89	20.90
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		23.63	51.73	12.30
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		30.06	56.90	34.50
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		39.94	12.26	5.10
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		36.19	39.64	82.50
Torbert, H.A.	1992	IL, America	47.98	-98.46	11.0	996	siltyclay loam	6.70	22.60	2.50	Maize	168		33.99	46.96	30.40
Tran, T.	1998	Quebec, Canada	45.63	-72.56	4.5	822	sandy loam	6.70	10.96	0.85	Maize	180		53.50	32.90	13.60
Tran, T.	1998	Quebec, Canada	45.63	-72.56	4.5	822	sandy clay loam	7.20	11.25	0.90	Maize	180		48.60	41.40	10.00
Tran, T.	1998	Quebec,	45.63	-72.56	4.5	822	siltylo	6.20	28.7	1.41	Maize	180		46.60	43.60	9.80

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
		Canada					am		7							
Tran, T.	1998	Quebec, Canada	45.63	-72.56	4.5	822	siltyloam	5.80	23.90	1.48	Maize	180		45.20	17.90	36.90
Tran, T.	1998	Quebec, Canada	45.63	-72.56	4.5	822	loam	5.90	26.80	1.51	Maize	180		43.40	47.20	9.40
Tran, T.	1998	Quebec, Canada	45.63	-72.56	4.5	822	sandyloam	5.90	12.47	0.87	Maize	180		53.00	20.70	26.30
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		24.50	22.60	52.90
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		27.50	27.30	45.20
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		35.30	28.30	36.40
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		25.70	24.30	50.00
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		48.00	26.70	25.30
Wang, S.	2015	Jiangsu, China	31.34	119.82	15.7	1177	siltyloam	5.60	15.40	1.79	Rice	240		37.90	25.20	36.90
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	12800	27.20	52.80	20.00
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	13900	36.50	51.90	11.60
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	14300	36.60	50.40	13.00

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	13500	28.60	47.10	24.30
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	14300	38.60	50.60	10.80
Wang, S.	2016	Shanxi, China	35.28	107.88	10.4	570	clayloam	8.30	8.10	1.00	Maize	225	14800	41.50	46.20	12.30
Wang, S. J.	2019	Shanxi, China	35.28	107.88	10.4	570	siltyclayloam	8.30	8.10	1.00	Maize	225		57.32	20.73	21.95
Wang, S. J.	2019	Shanxi, China	35.28	107.88	10.4	570	siltyclayloam	8.30	8.10	1.00	Maize	225		60.80	21.08	18.12
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Wheat	300	6366	24.30	46.30	29.40
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Wheat	210	6265	32.60	47.20	20.20
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Wheat	210	6429	41.10	49.40	9.50
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Maize	240	8471	28.70	32.70	38.60
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Maize	168	8369	42.10	34.00	23.90
Wang, X. B.	2009	Hebei, China	37.56	115.59	12.6	393	siltyloam	8.00	6.79	0.68	Maize	168	8556	46.00	37.40	16.60
Wang,	2016	Hebei,	37.50	115.10	13.4	481	claylo	8.60	11.7	0.81	Wheat	300	6370	24.35	44.27	31.38

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
X. B.		China					am		0							
Wang, X. B.	2016	Hebei, China	37.50	115.10	13.4	481	clayloam	8.60	11.70	0.81	Wheat	210	6270	32.59	42.44	24.97
Wang, X. B.	2016	Hebei, China	37.50	115.10	13.4	481	clayloam	8.60	11.70	0.81	Wheat	210	6430	41.07	39.88	19.05
Wang, X. B.	2016	Hebei, China	37.50	115.10	13.4	481	clayloam	8.60	11.70	0.81	Maize	240	8470	28.74	35.15	36.11
Wang, X. B.	2016	Hebei, China	37.50	115.10	13.4	481	clayloam	8.60	11.70	0.81	Maize	168	8370	42.00	32.82	25.18
Wang, X. B.	2016	Hebei, China	37.50	115.10	13.4	481	clayloam	8.60	11.70	0.81	Maize	168	8560	45.97	31.42	22.61
Xu, C.	2020	Shandong, China	36.96	118.10	12.5	543	clayloam	7.68	10.09	1.00	Maize	250		33.21	21.07	45.72
Xu, C.	2020	Shandong, China	36.96	118.10	12.5	543	clayloam	7.68	10.09	1.00	Maize	250		28.51	31.82	39.67
Xu, M. J.	2014	Hebei, China	36.34	114.50	13.4	494	siltyloam	7.72	16.30	0.70	Wheat	300	4559	18.19	69.33	12.48
Xu, M. J.	2014	Hebei, China	36.34	114.50	13.4	494	siltyloam	7.72	16.30	0.70	Wheat	139	6165	34.80	39.17	26.03
Xu, M. J.	2015	Hebei, China	36.34	114.50	13.4	494	siltyloam	7.72	16.30	0.70	Maize	250	8641	20.82	56.18	23.00
Xu, M. J.	2015	Hebei, China	36.34	114.50	13.4	494	siltyloam	7.72	16.30	0.70	Maize	185	9685	32.56	46.46	20.98
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	100	7922	35.10	26.20	38.70

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	150	8781	33.60	23.10	43.30
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	200	8854	33.90	19.50	46.60
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	250	9022	33.50	16.70	49.80
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	100	7531	28.90	27.20	43.90
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	150	7854	30.50	23.30	46.20
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	200	8195	31.00	18.60	50.40
Yan, J.	2009	Jiangsu, China	30.65	120.75	17.0	1154	loam	5.80	18.16	1.91	Rice	250	8265	29.00	17.80	53.20
Yi, Y.	2018	Jiangsu, China	34.28	117.18	15.2	800	loam		10.38	0.81	Wheat	225		55.80	33.60	10.60
Yi, Y.	2018	Jiangsu, China	34.28	117.18	15.2	800	loam		10.38	0.81	Wheat	225		59.40	36.10	4.50
Yi, Y.	2018	Jiangsu, China	34.28	117.18	15.2	800	loam		10.38	0.81	Wheat	225		41.50	27.90	30.60
Yi, Y.	2018	Jiangsu, China	34.28	117.18	15.2	800	loam		10.38	0.81	Wheat	225		34.80	43.30	21.90
Yi, Y.	2018	Jiangsu, China	34.28	117.18	15.2	800	loam		10.38	0.81	Wheat	225		27.70	43.30	29.00
Zhang,	2021	Beijing,	40.08	116.11	13.0	540	claylo	8.10	6.80	0.84	Maize	160	5734	62.60	25.09	12.31

First author	Year of publication	Region	Latitude	Longitude	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
C.		China					am									
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	8.10	7.30	0.87	Maize	160	5596	64.61	25.96	9.43
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	8.00	6.90	0.83	Maize	160	3761	40.68	50.77	8.56
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	7.90	8.20	1.12	Maize	160	4220	41.83	49.61	8.56
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	7.90	7.40	0.88	Maize	160	3853	43.27	45.29	11.44
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	7.70	8.40	1.07	Maize	160	4037	37.79	54.52	7.69
Zhang, C.	2021	Beijing, China	40.08	116.11	13.0	540	clayloam	7.70	10.90	1.28	Maize	160	5459	48.75	39.52	11.73
Zhang, L.	2010	Jilin, China	43.30	124.48	5.6	595	clayloam	6.20	14.90	1.35	Maize	180		36.60	35.10	28.30
Zhang, L.	2010	Jilin, China	43.30	124.48	5.6	595	clayloam	6.20	14.90	1.35	Maize	126		37.40	39.00	23.60
Zhang, Y.	2018	Shandong, China	36.93	116.64	13.1	582	loam	8.20	5.97	0.79	Maize	120		31.15	36.52	32.33
Zhang, Y.	2018	Shandong, China	36.93	116.64	13.1	582	loam	8.20	5.97	0.79	Maize	240		28.86	50.42	20.72
Zhao, W.	2014	Shanxi, China	34.27	108.08	12.0	332	loam		7.50	0.86	Wheat	165	1306	7.64	69.67	22.70
Zhao, W.	2014	Shanxi, China	34.27	108.08	12.0	332	loam		9.20	1.04	Wheat	165	7470	1.61	35.86	62.53

First author	Year of publication	Region	Lati	Longi	MAT (°C)	MAP (mm)	Soil texture	Soil pH	SOC (g kg ⁻¹)	TN (g kg ⁻¹)	Cropping season	¹⁵ N application rate (kg N ha ⁻¹ season ⁻¹)	Crop yield (kg ha ⁻¹)	Crop uptake of fertilizer-N (%)	Soil retention of fertilizer-N (%)	Loss of fertilizer-N (%)
Zhao, W.	2014	Shanxi, China	34.27	108.08	12.0	332	loam		13.20	1.40	Wheat	165	11440	1.73	25.71	72.56
Zuo, H. J.	2012	Henan, China	35.95	114.16	13.8	627	clayloam		10.82	1.08	Wheat	240		22.08	29.63	48.30
Zuo, H. J.	2012	Henan, China	35.95	114.16	12.4	488	siltyloam		12.03	1.21	Wheat	200		22.35	50.05	27.60
Zuo, H. J.	2012	Henan, China	35.95	114.16	11.9	555	loam		4.14	0.76	Wheat	180		40.70	48.00	11.30

References

- Aulakh, M. S., Garg, A. K., Manchanda, J. S., Dercon, G., Nguyen, M. L.(2017). Biological nitrogen fixation by soybean and fate of applied N-15-fertilizer in succeeding wheat under conventional tillage and conservation agriculture practices. *Nutrient Cycling in Agroecosystems*, 107(1), 79-89.
- Baker, J. L., Timmons, D. R.(1994). Fertilizer Management Effects on Leaching of Labeled Nitrogen for No-Till Corn in Field Lysimeters. *Journal of Environmental Quality*, 23(2), 305-310.
- Bandyopadhyay, K. K., Sarkar, M. C.(2005). Nitrogen use efficiency, N-15 balance, and nitrogen losses in flooded rice in an inceptisol. *Communications in Soil Science and Plant Analysis*, 36, 1661-1679.
- Blesh, J.,Drinkwater, L. E.(2014).Retention of N-15-Labeled Fertilizer in an Illinois Prairie Soil with Winter Rye.*Soil Science Society of America Journal*,78(2),496-508.
- Cai, G. X., Fan, X. F., Yang, Z., Zhu, D. L.(1998). Gaseous loss of nitrogen from fertilizers applied to wheat on a calcareous soil in North China Plain. *Pedosphere*, 8(1), 45-52.
- Cai, G., Chen, D., White, R. E., Fan, X. H., Pacholski, A., Zhu, Z. L., Ding, H.(2002). Gaseous nitrogen losses from urea applied to maize on a calcareous fluvo-aquic soil in the North China Plain. *Australian Journal of Soil Research*, 40(5), 737-748.
- Cao, Y. S., Sun, H. F., Zhang, J. N., Chen, G. F., Zhu, H. T., Zhou, S., Xiao, H. Y.(2018). Effects of wheat straw addition on dynamics and fate of nitrogen applied to paddy soils. *Soil & Tillage Research*, 178, 92-98.
- Chen, H., Liu, Y., Lü, K. P., Yuan, L. Chi, G. Y., etc.(2021). Effects of no-tillage and stover mulching on the transformation and utilization of chemical fertilizer N in Northeast China. *Soil Tillage Research*, 213, 105131.
- Dai, K. 2012.Study on Optimal utilization of water and nitrogen of winter wheat/summer maize in North China Plain.Ph. D thesis,Chinese Academy of Agricultural Sciences,Beijing.
- Dang, T. H.,Cai, G. X.,Guo, S. L.,Hao, M. D.,Wang, B. Q.(2001).Study on nitrogen use efficiency and direction of dryland winter wheat with 15N labeled fertilizer.*Journal of Nuclear Agricultural Sciences*,17(4),280-285.(in Chinese with an English abstract)
- Ebissa, T. M.,Yang, B.,Guan, Y. Q.,Tan, B. C.,Chen, P. Z.,Wang, L. L.,Magwanga, R. O.,Zheng, X. Q.(2018).A Comparison of Nitrogen Transfer and Transformation in Traditional Farming and the Rice-Duck Farming System by N-15 Tracer Method.*Agronomy-Basel*,8(12),289.
- Fan, M. S., Lu, S. H., Jiang, R. F., Liu, X. J., Zeng, X. Z., Goulding, Keith W. T., Zhang, F. S.(2007). Nitrogen input, 15N balance and mineral N dynamics in a rice–wheat rotation in southwest China.

- Nutrient Cycling in Agroecosystems, 79(3), 255-265.
- Gabriel, J.L., Quemada, M. (2011). Replacing bare fallow with cover crops in a maize cropping system: Yield, N uptake and fertiliser fate. *European Journal of Agronomy*, 34, 133–143.
- Grageda-Cabrera, O. A., Vera-Núñez, J. A. , Aguilar-Acua, J. L., Macías-Rodríguez, L., Pea-Cabriales, J. J.(2011). Fertilizer dynamics in different tillage and crop rotation systems in a Vertisol in Central Mexico. *Nutrient Cycling in Agroecosystems*, 89, 125–134.
- Guo, R. Y., Qin, W., Jiang, C. G., Kang, L. Y., Nendel, C., Chen, Q.(2018). Sweet corn significantly increases nitrogen retention and reduces nitrogen leaching as summer catch crop in protected vegetable production systems. *Soil & Tillage Research*, 180, 148-153.
- Guo, S., Jiang, R., Qu, H. C., Wang, Y. L., Misselbrook, T., Gunina, A., Kuzyakov, Y.(2019). Fate and transport of urea-N in a rain-fed ridge-furrow crop system with plastic mulch. *Soil & Tillage Research*,186, 214–223.
- Hamid, A.,Ahmad, M..(1995).Interaction of ¹⁵N-labelled ammonium nitrate, urea and ammonium sulphate with soil N during growth of wheat (*Triticum aestivum* L.) under field conditions.*Biology Fertility of Soils*,20(3),185-189.
- Helena, R.K., Rubio, G., Lavado, R. S.(2009). Effect of Water Stress in Maize Crop Production and Nitrogen Fertilizer Fate. *Journal of Plant Nutrition*, 32(4), 565-578.
- Hu, C. X., Yu, J. H., Sun, S. Z., Yan, Y. Y., Guo, H., Tan, Z. W., Jiang, D., Cao, W. X., Dai, T. B.(2019). Reduced N-15 Losses by Winter and Spring Night-Warming Are Related to Root Distribution of Winter Wheat. *Frontiers in Plant Science*, 10, 771.
- Janine Kettering, Marianne Ruidisch, Camila Gaviria, Yong Sik Ok & Yakov Kuzyakov .(2013).Fate of fertilizer ¹⁵N in intensive ridge cultivation with plastic mulching under a monsoon climate.*Nutr Cycl Agroecosyst* ,95,57–72.
- Jayasundara, S., Wagner-Riddle, C., Parkin, G., von Bertoldi, P., Warland, J., Kay, B., Voroney, P.(2007). Minimizing nitrogen losses from a corn-soybean-winter wheat rotation with best management practices. *Nutrient Cycling in Agroecosystems*,79(2), 141–159.
- Ji, J. H., Li, J., Luo, J. F., Shi, Y. L., Lindsey, S., Liu, S. Q., Li, Y. Y., Zhao, C. J.(2020). How N fertilizer side-dressing timings mediate fertilizer N fates in maize grown in a Mollisol. *Archives of Agronomy and Soil Science*, <https://doi.org/10.1080/03650340.2020.1786539>
- Jiang, C. Q., Lu, D. J., Zu, C. L., Zhou, J. M., Wang, H. Y.(2018). Root-zone fertilization improves crop yields and minimizes nitrogen loss in summer maize in China. *Scientific Reports*, 8, 15139.

- Jokela, William E., Randall, Gyles W. (1997). Fate of Fertilizer Nitrogen as Affected by Time and Rate of Application on Corn. *Soil Science Society of America Journal*, 61(6), 1695-1703.
- Ju, X. T., Liu, X. J., Pan, J. R., & Zhang, F. S. (2007). Fate of ¹⁵N-Labeled Urea Under a Winter Wheat-Summer Maize Rotation on the North China Plain. *Pedosphere*, 17(1), 52-61.
- Ju, X. T., Xing, G. X., Chen, X. P., Zhang, S. L., Zhang, L. J., Liu, X. J., Cui, Z. L., Yin, B., Christie, P., Zhu, Z. L. (2018). Reducing environmental risk by improving N management in intensive Chinese agricultural systems. *Proceedings of the National Academy of Sciences of the United States of America*, 9, 3041-3046.
- Karlen, D. L., Hunt, P. G., Matheny, T. A. (1996). Fertilizer ¹⁵Nitrogen Recovery by Corn, Wheat, and Cotton Grown with and without Pre-Plant Tillage on Norfolk Loamy Sand. *Crop Science*, 36(4), 975-981.
- Kramer, A. W., Doane, T. A., Horwath, W. R., Kessel, C. V. (2002). Short-term nitrogen-¹⁵ recovery vs. long-term total soil N gains in conventional and alternative cropping systems. *Soil Biology Biochemistry*, 34(1), 43-50.
- Lenka, N. K., Lenka, S., Mahapatra, P., Sharma, N., Kumar, S., Aher, S. B., Yashona, D. S. (2019). The fate of ¹⁵N labeled urea in a soybean-wheat cropping sequence under elevated CO₂ and/or temperature. *Agriculture Ecosystems & Environment*, 282:23-29.
- Li, G. H., Lin, J. J., Xue, L. H., Ding, Y. F., Wang, S. H., Yang, L. Z. (2018). Fate of Basal N Under Split Fertilization in Rice with ¹⁵N Isotope Tracer. *Pedosphere*, 28(1), 135-141.
- Li, J. H. 2015. Effects of nitrogen application on ¹⁵N uptake, utilization and nitrogen metabolism of rice in cold region. Ph. D thesis, Heilongjiang Bayi Agricultural University, Mishan.
- Li, K., Shiraiwa, T., Inamura, T., Saitoh, K., Horie, T. (2001). Recovery of ¹⁵N-labeled ammonium by barley and maize grown on the soils with long-term application of chemical and organic fertilizers. *Plant Production Science*, 4(1), 29-35.
- Li, P. F., Li, X. K., Hou, W. F., Ren, T., Cong, R. H., Du, C. W., Xing, L. H., Wang, S. H., Wei, J. W. (2018). Studying the Fate and Recovery Efficiency of Controlled Release Urea in Paddy Soil Using ¹⁵N Tracer Technique. *Scientia Agricultura Sinica*, 51(20), 3961-3971. (in Chinese with an English abstract)
- Li, P. F. 2018. Effects of controlled release urea on yield, nitrogen loss and nitrogen use efficiency of double cropping rice. Ph. D thesis, Huazhong Agricultural University, Wuhan.
- Liang, B., He, X. H., Daniel, V. M., Zhou, J. B. (2013). Fate of ¹⁵N-labeled fertilizer in soils under dryland

- agriculture after 19 years of different fertilizations %J *Biology & Fertility of Soils*. *Biology and Fertility of Soils*, 49(8), 977-986.
- Liang, H. Y., Shen, P. F., Kong, X. Z., Liao, Y. C., Liu, Y., Wen, X. X.(2020). Optimal Nitrogen Practice in Winter Wheat-Summer Maize Rotation Affecting the Fates of N-15-Labeled Fertilizer. *Agronomy-Basel*, 10, 521.
- Lin, J. J., Li, G. H., Xue, L. H., Zhang, W. J., Xu, H. G., Wang, S. H., Yang, L. Z., Ding, Y. F.,(2014). Subdivision of Nitrogen Use Efficiency of Rice Based on ¹⁵N Tracer. *ACTA AGRONOMICA SINICA*, 40(8): 1424-1434.(in Chinese with an English abstract)
- Liu, X. W., Chen, X. Q., Wang, H. Y., Lu, D. J., Zhou, J. M., Chen, Z. J., Zhu, D. J.(2017). Effects and Principle of Root-zone One-time N Fertilization on Enhancing Rice (*Oryza sativa* L.) N Use Efficiency. *Soils*, 49(5), 868–875.(in Chinese with an English abstract)
- Ma, Q. J., Li, X. G., Song, W. Y., Jia, B., Zhang, Q., Lin, L. M., Li, F. M.(2018). Plastic-film mulch and fertilization rate affect the fate of urea-N-15 in maize production. *Nutrient Cycling in Agroecosystems*, 112(3), 403-416.
- Maddux, L. D., Barnes, P. L., Raczkowski, C. W., Kissel, D. E.(1991). Broadcast and Subsurface-Banded Urea Nitrogen in Urea Ammonium Nitrate Applied to Corn. *Soil Science Society of America Journal*, 55(1), 264-267.
- Mapiki, A., Bhaskar, G., & Singh, R. G.(2014). Fate of Fertilizer-N to a Maize Crop Grown in Northern Zambia. *Soil & Plant Science*, 43(4), 231-237.
- Massimiliano, D., Bell, M. J., Grace, P. R., Rowlings, D. W., Scheer, C., Strazzabosco, A.(2014). Assessing agronomic and environmental implications of different N fertilisation strategies in subtropical grain cropping systems on Oxisols. *Nutrient Cycling in Agroecosystems*, 100(3), 369-382.
- Norman, R., Roberts, T., Slaton, N., Fulford, A.(2013). Nitrogen uptake efficiency of a hybrid compared with a conventional, pure-line rice cultivar. *Soil Fertility & Plant Nutrition*, 77(4), 1235-1240.
- Normand, B., Vachaud, G., Recous, S., Kengni, L., Garino, B.(1997). Nitrogen-15 tracers combined with tensio-neutronic method to estimate the nitrogen balance of irrigated maize. *Soil Science Society of America Journal*, 61(5), 1508-1518.
- Qi, D. L., Hu, T. T., Song, X.(2020). Effects of nitrogen supply methods on fate of nitrogen in maize under alternate partial root-zone irrigation. *International Journal of Agricultural and Biological Engineering*, 13(3), 129-135.
- Hajrasuliha, S., Rolston, D. E., Louie, D. T.(1998). Fate of Nitrogen-15 Enriched Ammonium Nitrate

- Applied to Corn. *Soil science society of america journal*, 57, 111-115.
- Rees, R. M., Roelcke, M., Li, S. X., Wang, X. Q., Richter, J. (1996). The effect of fertilizer placement on nitrogen uptake and yield of wheat and maize in Chinese loess soils. *Nutrient Cycling in Agroecosystems*, 47(1), 81-91.
- Reis, A. F. D., de Almeida, R. E. M., Lago, B. C., Trivelin, P. C., Linqvist, B., Favarin, J. L. (2018). Aerobic rice system improves water productivity, nitrogen recovery and crop performance in Brazilian weathered lowland soil. *Field Crops Research*, 218, 59-68.
- Rimski-Korsakov, H., Rubio, G., Lavado, R. S.(2012). Fate of the nitrogen from fertilizers in field-grown maize. *Nutrient Cycling in Agroecosystems*, 93(3), 253-263.
- Song, J. G. 1999.Effects of Straw and Nitrification Inhibitor Application on Soil Nitrogen Transformation in Winter Wheat and Summer Corn Rotation. Ph. D thesis, China Agricultural University, Beijing.
- Stevens, W. B., Hoelt, R. G., Mulvaney, R. L.(2005). Fate of Nitrogen - 15 in a Long - Term Nitrogen Rate Study: I. Interactions with Soil Nitrogen. *Agronomy Journal*, 97, 1046 - 1053.
- Sui, C. L., Zhang, M.(2014).Nitrogen Recovery and Fate of Polymer Coated 15N-urea Fertilizers under Corn-Wheat Rotation. *Acta Agriculturae Boreali-Occidentalis Sinica*, 23(9), 120-127.(in Chinese with an English abstract)
- Timmons, D. R., Cruse, R. M. (1990). Effect of Fertilization Method and Tillage on Nitrogen-15 Recovery by Corn. *Agronomy Journal*, 82(4), 777-784.
- Timmons, D. R., Baker, J. L. (1992). Fertilizer Management Effects on Recovery of Labeled Nitrogen by Continuous No-Till. *Agronomy Journal*, 84, 490-496.
- Torbert, H. A., Mulvaney, R. L., Huevel, Rmv, Hoelt, R. G.(1992). Soil Type and Moisture Regime Effects on Fertilizer Efficiency Calculation Methods in a Nitrogen-15 Tracer Study. *Agronomy Journal*, 84(1), 66-70.
- Tran, T., Giroux, M.(1998).Fate of 15N-labelled fertilizer applied to corn grown on different soil types.*Canadian Journal of Soil Science*, 78(4), 597-605.
- Wang, S., Zhao, X., Xing, G., Yang, Y., Zhang, M., Chen, H.(2015). Improving grain yield and reducing N loss using polymer-coated urea in southeast China. *Agronomy for Sustainable Development*, 35(3), 1103-1115.
- Wang, S., Luo, S., Yue, S., Shen, Y., Li, S.(2016). Fate of N fertilizer under different nitrogen split applications to plastic mulched maize in semiarid farmland. *Nutrient Cycling in Agroecosystems*, 105, 129-140.

- Wang, S. J., Luo, S. S., Yue, S. C., Shen, Y. F., Li, S. Q.(2019).Residual effects of fertilizer N response to split N applications in semiarid farmland. *Nutrient Cycling in Agroecosystems*, 114(2), 99-110.
- Wang, X. B. 2009. Study on nitrogen cycle and balance in winter wheat/summer maize rotation field under optimal nitrogen application. Ph. D thesis, Chinese Academy of Agricultural Sciences, Beijing.
- Wang, X. B., Zhou, W., Liang, G. Q., Pei, X. X., Li, K. J.(2016).The fate of N-15-labelled urea in an alkaline calcareous soil under different N application rates and N splits. *Nutrient Cycling in Agroecosystems*, 106(3), 311–324.
- Wei, Y. J., Xia, B., Zhao, Y., Zou, Y. B.,Effects of Nitrogen Application on Yield Formation and the Nitrogen Absorption and Utilization of Super Rice Based on ¹⁵N-tracing.*Journal of Nuclear Agricultural Sciences*,30(4),783-791.(in Chinese with an English abstract)
- Wu, P. J.,Yan, S. H,Zhang, C. Y.,Shao, Q. Q.,Xu, F.,Li, W. Y.(2019).The effects of nitrogen application rate on nitrogen uptake and utilization and yield of weak gluten wheat were analyzed by ¹⁵N.*Soil and Fertilizer Sciences in China*,(04):121-126.(in Chinese with an English abstract)
- Xu, H. G.,Zhong, G. R.,Lin, J. J.,Ding, Y. F.,Li, G. H.,Wang, S. H.,Liu, Z. H.,Tang, S.,Ding, C. Q.(2015).Effect of nitrogen management during the panicle stage in rice on the nitrogen utilization of rice and succeeding wheat crops.*European Journal of Agronomy*,70,41-47.
- Xu, C., Han, X., Zhuge, Y., Xiao, G., Meng, F.(2020). Crop straw incorporation alleviates overall fertilizer-N losses and mitigates N₂O emissions per unit applied N from intensively farmed soils: An in situ ¹⁵N tracing study. *Science of The Total Environment*, 764, 142884.
- Xu, M. J., Dong, X. X., Liu, H. L., Zhang, L. J., Ju, X. T.(2014).Effects of different management patterns on uptake,distribution and fate of nitrogen in wheat. *Journal of Plant Nutrition and Fertilizer*, 20(5), 1084-1093. (in Chinese with an English abstract)
- Xu, M. J., Zhang, L., Wang, X. Y., Peng, Y. J., Zhang, L. J., Ju, X. T.(2015). Effects of different management patterns on uptake, distribution and fate of nitrogen in summer maize. *Journal of Plant Nutrition and Fertilizer*, 21(1), 36-45. (in Chinese with an English abstract)
- Yan, J. 2009. Study on the optimum amount of nitrogen fertilizer and its utilization efficiency in rice and wheat rotation system in Taihu Lake area. Ph. D thesis, Nanjing Agricultural University, Nanjing.
- Yang, Y. M.,Wang, X. B.,Dai, K.,Jia, S. L.,Meng, C. X.,Zhao, Q. S.,Zhang, X. M.,Zhang, D. C.,Feng, Z. H.,Sun, Y. M.,Wu, X. P.,Cai, D. X.,Grant, C.(2011).Fate of labeled urea-N-15 as basal and topdressing applications in an irrigated wheat-maize rotation system in North China plain: II summer maize.*Nutrient Cycling in Agroecosystems*,90(3),379-389.

- Yi, Y. 2018. Study on density and nitrogen control effect of stable yield, High Yield and nitrogen Saving of rice wheat in Huaibei, Jiangsu Province. Ph. D thesis, Yangzhou University, Yangzhou.
- Yu, J. 2012. Effects of combined application of different organic and inorganic fertilizers on growth and nitrogen uptake of wheat and rice. Ph. D thesis, Nanjing Agricultural University, Nanjing.
- Yuan, L., Chen, X., Jia, J., Chen, H., Lu, C. (2021). Stover mulching and inhibitor application maintain crop yield and decrease fertilizer N input and losses in no-till cropping systems in Northeast China. *Agriculture Ecosystems Environment*, 312, 107360.
- Zhang, C., Rees, R. M., Ju, X. (2021). Fate of ¹⁵N-labelled urea when applied to long-term fertilized soils of varying fertility. *Nutrient Cycling in Agroecosystems*, 121, 151-165.
- Zhang, L., Wu, Z., Jiang, Y., Chen, L., Ma, X. (2010). Fate Of Applied Urea ¹⁵N In A Soil-Maize System As Affected By Urease Inhibitor And Nitrification Inhibitor. *Plant Soil Environment*, 56(1), 8-15.
- Zhang, Y., Li, F. D., Shi, P., Wei, A. L. (2018). Study on the Fate of Nitrogen Fertilizer Applied to Maize Cropping System in the North China Plain. *Journal of Soil and Water Conservation*, 32(4), 210-215.
- Zhang, Z. X., Chen, S. H., Chen, P., Liu, M., Shang, W. B. (2018). Fate of Maize Topdressing Nitrogen under Different Irrigation Schemes Based on ¹⁵N Tracer Technology. *Transactions of the Chinese Society for Agricultural Machinery*, 49(12), 262-271. (in Chinese with an English abstract)
- Zhang, Z. X., Chen, P., Chen, S. H., Zheng, E. N., Nie, T. Z., Liu, M. (2018). ¹⁵N Tracer-based Analysis of Water and Nitrogen Management Differences in Uptake and Partitioning of N Applied at Different Growth Stages in Transplanted Rice. *Transactions of the Chinese Society for Agricultural Machinery*, 49(6), 309-346. (in Chinese with an English abstract)
- Zhao, W. 2014. Study on nitrogen whereabouts and mechanism of residual fertilizer in different fertility soils. Ph. D thesis, Northwest A&F University, Xianyang.
- Zuo, H. J., Bai, Y. L., Lu, Y. L., Wang, L., Wang, H., & Wang, Z. Y. (2012). Fate of Fertilizer Nitrogen Applied to Winter Wheat in North China Plain Based on High Abundance of ¹⁵N. *Scientia Agricultura Sinica*, 45(15), 3093-3099. (in Chinese with an English abstract)