

Table S1 The country, soil type, organic matter, total N content, Olsen-P, exchange-K and pH for all 33 sites and two systems (CP and Y)

Sites	Country	Management	Soil type	Organic matter kg kg <sup>-1</sup>	Total N	Olsen-P mg kg <sup>-1</sup>	exchange-K mg kg <sup>-1</sup>	pH
S1	Huaxian	CP	Calcareous Fluvo-Aquic Soil	16.0	0.91	6	106	8.2
		HY		13.2	0.90	11	71	8.0
S2	Fugou1	CP	Calcareous Fluvo-Aquic Soil	13.5	0.88	16	101	8.0
		HY		13.5	0.97	16	101	8.0
S3	Luyi1	CP	Calcareous Fluvo-Aquic Soil	11.1	0.78	6	72	7.7
		HY		20.3	1.07	12	237	8.0
S4	Weihui	CP	Calcareous Fluvo-Aquic Soil	15.8	0.89	32	92	7.9
		HY		16.1	1.19	5	88	7.6
S5	Luyi2	CP	Calcareous Fluvo-Aquic Soil	13.9	0.85	5	51	8.0
		HY		14.7	0.93	12	150	8.4
S6	Minquan	CP	Calcareous Fluvo-Aquic Soil	16.2	1.45	17	193	8.2
		HY		16.8	0.70	11	88	8.1
S7	Nanzhao	CP	Yellow Brown Soil	16.7	0.80	20	92	6.7
		HY		15.2	0.66	19	192	7.8
S8	Ruzhou	CP	Calcareous Fluvo-Aquic Soil	23.4	1.36	16	122	7.8
		HY		30.2	1.10	9	72	7.4
S9	Xiangcheng	CP	Calcareous Fluvo-Aquic Soil	15.2	1.10	6	145	7.1
		HY		14.8	0.90	7	148	6.7
S10	Zhenping	CP	Lime Concretion Black Soils	15.6	0.90	11	86	6.4
		HY		11.7	0.90	16	79	6.9
S11	Luoning	CP	Cinnamon Soil	23.6	0.40	17	195	8.2
		HY		15.6	1.00	6	192	8.0
S12	Qiangfeng	CP	Calcareous Fluvo-Aquic Soil	8.8	0.90	8	61	8.2
		HY		12.2	0.90	20	103	8.2
S13	Suiping	CP	Yellow Cinnamon Soil	13.0	0.90	8	73	6.8

		HY		12.8	0.80	15	73	6.8
S14	Shanxian	CP	Cinnamon Soil	17.4	0.90	16	165	8.0
		HY		15.7	1.00	16	537	8.7
S15	Fugou2	CP	Calcareous Fluvo-Aquic Soil	7.2	0.90	15	76	8.2
		HY		10.2	0.60	18	112	8.0
S16	Boxiang	CP	Cinnamon Soil	16.2	0.90	92	106	7.1
		HY		16.4	0.90	92	95	7.1
S17	Daming	CP	Calcareous Fluvo-Aquic Soil	12.3	0.90	150	139	7.4
		HY		6.4	0.80	145	122	7.3
S18	Lincheng	CP	Meadow Sanne Soil	20.9	0.90	86	69	-
		HY		18.6	1.42	102	114	-
S19	Pingxiang	CP	Calcareous Fluvo-Aquic Soil	12.2	0.85	98	200	7.1
		HY		14.1	0.88	83	113	7.2
S20	Boxiang	CP	Calcareous Fluvo-Aquic Soil	15.2	1.10	23	186	6.9
		HY		15.4	0.85	15	154	6.8
S21	Leling	CP	Calcareous Fluvo-Aquic Soil	9.7	1.07	18	138	7.2
		HY		8.7	1.05	15	134	7.2
S22	Linshu	CP	Cinnamon Soil	14.3	0.74	9	89	-
		HY		14.3	1.08	11	60	-
S23	Linzi	CP	Cinnamon Soil	13.3	0.86	11	120	6.7
		HY		16.6	0.74	59	171	6.7
S24	Lingxian	CP	Calcareous Fluvo-Aquic Soil	16.4	1.17	20	170	7.0
		HY		10.8	1.32	18	103	7.0
S25	Pingyin	CP	Cinnamon Soil	9.4	0.90	26	96	7.5
		HY		9.6	1.00	32	132	7.5
S26	Qingyun	CP	Brown Soil	16.7	0.80	28	92	6.9
		HY		16.3	0.80	28	102	6.9
S27	Tancheng	CP	Brown Soil	25.2	0.80	22	70	7.0

		HY		17.6	0.30	6	84	7.2
S28	Weicheng	CP	Calcareous Fluvo-Aquic Soil	14.1	0.60	17	143	7.5
		HY		15.7	0.80	18	119	7.5
S29	Zhangqiu	CP	Calcareous Fluvo-Aquic Soil	18.7	0.70	16	108	6.8
		HY		17.5	0.80	22	109	6.8
S30	Zhaoyuan	CP	Calcareous Fluvo-Aquic Soil	10.1	1.00	18	71	6.5
		HY		12.7	0.90	29	78	6.5
S31	Dezhou	CP	Lime Concretion Black Soils	10.2	0.90	29	92	7.0
		HY		14.3	0.80	44	193	7.1
S32	Chencang	CP	Yellow Soil	11.9	0.60	22	194	8.2
		HY		13.7	1.20	39	170	8.2
S33	Jiyang	CP	Yellow Soil	12.0	0.80	23	207	8.1
		HY		12.3	0.80	19	169	8.1
<b>Mean</b>		<b>CP</b>		<b>14.7</b>	<b>0.92</b>	<b>27</b>	<b>119</b>	<b>7.4</b>
		<b>HY</b>		<b>14.7</b>	<b>0.89</b>	<b>29</b>	<b>135</b>	<b>7.5</b>

Table S2 GHG emissions factors of agricultural input

Input	unit	GHG emissions (kg CO <sub>2</sub> eq per unit input)				References
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total	
N fertilizer production	kg N	7.61	0.56	0.03	8.21	(Zhang <i>et al.</i> , 2012)
N fertilizer transportation	kg N	0.08	0.00	0.00	0.09	(Di <i>et al.</i> , 2005; IPCC, 2006; Yuan <i>et al.</i> , 2006; National Bureau of Statistics of China, 2011a, b)
Pesticides production and transportation	kg	18.28	0.80	0.05	19.12	(Williams <i>et al.</i> , 2006)
Diesel fuel	kg	3.38	0.00	0.00	3.38	(IPCC, 2006; Yuan <i>et al.</i> , 2006; National Bureau of Statistics of China, 2011a)

## References:

- Di, X., Nie, Z., Zuo, T., 2005. Life cycle emission inventories for the fuels consumed by thermal power in China. *China Environmental Science* 25 632-635 (in Chinese with English abstract).
- IPCC. 2006. Energy. In: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme (eds Eggleston, S., Buendia, L., Miwa, K., Ngara, T., Tanabe, K.), IGES, Japan
- National Bureau of Statistics of China, 2011a. *China Energy Statistical Yearbook*. China Statistics Press, Beijing, China.
- National Bureau of Statistics of China, 2011b. *China Statistical Yearbook*. China Statistics Press, Beijing, China.
- Williams, A.G., Audsley, E., Sandars, D.L., 2006. Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities. Final report to Defra on project IS0205. Available on [www.agrilca.org](http://www.agrilca.org) and [www.defra.gov.uk](http://www.defra.gov.uk).
- Yuan, B., Nie, Z., Di, X., Zuo, T., 2006. Life cycle inventories of fossil fuels in China( II ):Final life cycle inventories. *Modern Chemical Industry* 26, 59-61 (in Chinese with English abstract).
- Zhang, W.F, Dou, Z.X, He, P., Ju, X.T., Powlson, D.T, Chadwick, D.T, Norse, D.T, Lu, Y., 2012. New technologies reduce greenhouse gas emissions from nitrogenous fertilizer in China. *Proceedings of the National Academy of Sciences, USA*. doi: 10.1073/pnas.1210447110