Supplement of

Impacts of silicon on biogeochemical cycles of carbon and nutrients in croplands

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Table S1 References for data used in figures

Figure	Reference
Fig. 1	Al-aghabary *et al*. 2005; Hattori *et al*. 2005; Kaya *et al*. 2006; Tuna *et al*. 2008; Zuccarini 2008; Pei *et al*. 2010; Shen *et al*. 2010; Abdalla *et al*. 2011; Chen *et al*. 2011; Gao *et al*. 2011; Detman *et al*. 2012; Ming *et al*. 2012; Ali *et al*. 2013; Farooq *et al*. 2013; Ashfaque *et al*. 2017.
Fig. 2	Horst and Marschner 1978; Ma *et al*. 1990; Marschner *et al*. 1990; Ma and Takahashi 1993; Shi *et al*. 1996; Wei *et al*. 1997; Ma *et al*. 2001; Al-aghabary *et al*. 2005; Hattori *et al*. 2005; Liang *et al*. 2005; Kaya *et al*. 2006; Gunes *et al*. 2007; Tuna *et al*. 2008; Zuccarini 2008; Ali *et al*. 2009; Soylemezoglu *et al*. 2009; Ashraf *et al*. 2010; Pei *et al*. 2010; Shen *et al*. 2010; Abdalla 2011; Chen *et al*. 2011a; Xiao *et al*. 2011; Detman *et al*. 2012; Fu *et al*. 2012; Ming *et al*. 2012; Ali *et al*. 2013; Farooq *et al*. 2013; Gonzalo *et al*. 2013; Pavlovic *et al*. 2013; Ahmad 2014; Bityutskii *et al*. 2014; Ma *et al*. 2014; Abbas *et al*. 2015; Li *et al*. 2015; Mateos-Naranjo *et al*. 2015; Mehrabanjoubani *et al*. 2015a,b; Tripathi *et al*. 2015; Xu *et al*. 2015; Ali *et al*. 2016; Garg and Bhandari 2016; Marxen *et al*. 2016; Pascual *et al*. 2016; Pati *et al*. 2016; Wu *et al*. 2016a,b,c; Yang *et al*. 2016; Zhu *et al*. 2016; Ashfaque *et al*. 2017; Barreto *et al*. 2017; Guong *et al*. 2017; Kostic *et al*. 2017; Zhang *et al*. 2017.
Fig. 3	Osuna-Canizaler *et al*. 1991; Shi *et al*. 1996; Deren 1997; Wei *et al*. 1997; Li *et al*. 1999; Chen *et al*. 2011b; Detman *et al*. 2012; Dong *et al*. 2012; Schaller and Struyf 2013; Bin *et al*. 2015; Tripathi *et al*. 2015; Marxen *et al*. 2016; Pati *et al*. 2016; Wu *et al*. 2016c; Yang *et al*. 2016; Zhang *et al*. 2016; Ashfaque *et al*. 2017; Barreto *et al*. 2017; Guong *et al*. 2017; Zhang *et al*. 2017.

Fig. 4	Shi *et al*. 1996; Deren 1997; Wei et al. 1997; Li et al. 1999; Dong et al. 2012; Schaller and Struyf 2013; Bin *et al*. 2015; Mehrabanjoubani *et al*. 2015a,b; Tripathi *et al*. 2015; Marxen *et al*. 2016; Pati *et al*. 2016; Zhang *et al*. 2016; Guong *et al*. 2017; Kostic *et al*. 2017; Zhang *et al*. 2017.
Fig. 5	Horst and Marschner 1978; Shi *et al*. 1996; Wei *et al*. 1997; Li *et al*. 1999; Kaya *et al*. 2006; Tuna *et al*. 2008; Zuccarini *et al*. 2008; Ali *et al*. 2009; Ashraf *et al*. 2010; Pei *et al*. 2010; Chen *et al*. 2011a; Gao *et al*. 2011; Dong *et al*. 2012; Schaller and Struyf 2013; Ahmad 2014; Ma *et al*. 2014; Mehrabanjoubani *et al*. 2015a,b; Tripathi *et al*. 2015; Xu *et al*. 2015; Marxen *et al*. 2016; Pati *et al*. 2016; Zhang *et al*. 2016; Barreto *et al*. 2017; Guong *et al*. 2017; Zhang *et al*. 2017
Fig. 6	Horst and Marschner 1978; Ma *et al*. 1990; Marschner *et al*. 1990; Ma and Takahashi 1993; Shi *et al*. 1996; Li *et al*. 1999; Kaya *et al*. 2006; Gunes *et al*. 2007; Tuna *et al*. 2008; Zuccarini *et al*. 2008; Soylemezoglu *et al*. 2009; Pei *et al*. 2010; Chen *et al*. 2011a; Gao *et al*. 2011; Dong *et al*. 2012; Fu *et al*. 2012; Gonzalo *et al*. 2013; Pavlovic *et al*. 2013; Schaller and Struyf 2013; Bityutskii *et al*. 2014; Ma *et al*. 2014; Mehrabanjoubani *et al*. 2015a,b; Tripathi *et al*. 2015; Xu *et al*. 2015; Ali *et al*. 2016; Garg and Bhandari 2016; Marxen *et al*. 2016; Pascual *et al*. 2016; Barreto *et al*. 2017.
Fig. 7	Horst and Marschner 1978; Ma *et al*. 1990; Marschner *et al*. 1990; Osuna-Canizaler *et al*. 1991; Ma and Takahashi 1993; Shi *et al*. 1996; Deren 1997; Wei *et al*. 1997; Li *et al*. 1999; Kaya *et al*. 2006; Gunes *et al*. 2007; Tuna *et al*. 2008; Zuccarini *et al*. 2008; Ali *et al*. 2009; Soylemezoglu *et al*. 2009; Ashraf *et al*. 2010; Pei *et al*. 2010; Chen *et al*. 2011a,b; Gao *et al*. 2011; Detman *et al*. 2012; Dong *et al*. 2012; Fu *et al*. 2012; Gonzalo *et al*. 2013; Schaller and Struyf 2013; Ahmad 2014; Bityutskii *et al*. 2014; Ma *et al*. 2014; Bin *et al*. 2015; Mehrabanjoubani *et al*. 2015a,b; Tripathi *et al*. 2015; Xu *et al*. 2015; Marxen *et al*. 2016; Pati *et al*. 2016; Wu *et al*. 2016c; Yang *et al*. 2016; Zhang *et al*. 2016; Ashfaque *et al*. 2017; Barreto *et al*. 2017; Kostic *et al*. 2017; Guong *et al*. 2017; Zhang *et al*. 2017

Table S2 Silicon content in various crops increased by silicon application

Species	Si concentration in plant biomass (g kg^{-1})		Net increase (g kg^{-1})	Reference
	− Si	+ Si		
Zea mays	0.20	3.47	3.28	Kaya et al. 2006
	0.20	6.19	5.99	
	0.11	3.19	3.08	
	0.11	5.60	5.49	
Oryza sativa	38.74	45.88	7.14	Chen et al. 2011a
	40.95	50.90	9.95	
	40.96	53.61	12.65	
	44.57	54.12	9.55	
	13.04	28.91	15.87	
	9.09	22.51	13.42	
	20.18	31.98	11.80	
	14.24	25.55	11.31	
Oryza sativa	11.40	51.00	39.60	Detmann et al. 2012
	9.90	29.10	19.20	
	11.70	47.30	35.60	
	6.00	25.50	19.50	
Oryza sativa	4.70	4.81	0.11	Pati et al. 2016
	4.70	5.09	0.39	
	4.70	5.21	0.51	
	5.00	5.31	0.31	
	5.00	5.71	0.70	
	5.00	6.01	1.01	
	25.50	30.21	4.70	
	25.50	30.81	5.30	

	25.50	31.11	5.61	
	26.61	29.31	2.70	
	26.61	33.61	7.00	
	26.61	37.61	11.00	
Oryza sativa	4.01	4.83	0.81	Cuong et al. 2017
	4.01	5.03	1.01	
	4.01	5.32	1.31	
	4.01	5.94	1.93	
	27.00	30.19	3.19	
	27.00	33.30	6.30	
	27.00	34.68	7.68	
	27.00	35.44	8.43	
Oryza sativa	20.34	48.48	28.14	Gao et al. 2011
	25.30	61.96	36.66	
	14.90	46.59	31.69	
	19.63	53.21	33.58	
Gammarus	10.08	50.12	40.04	Schaller and Struyf
pulex	1.68	8.40	6.72	2013
	0.84	7.84	7.00	
Cucumis	3.60	14.00	10.40	Pavlovic et al. 2013
sativus	3.70	15.70	12.00	
Gossypium	0.18	1.51	1.33	Mehrabanjoubani et
hirsutum	0.57	2.39	1.24	al. 2015
Brassica	0.10	1.34	1.40	
napus	0.96	5.07	4.11	
Triticum	0.81	2.21	1.82	
aestivum	7.37	17.99	10.62	
Saccharum	9.10	33.20	24.10	Ashraf et al. 2010
officinarum	9.10	49.20	40.10	

	9.10	61.50	52.40	
	13.50	39.80	26.30	
	13.50	52.20	38.70	
	13.50	69.40	55.90	
	5.40	13.90	8.50	
	5.40	27.30	21.90	
	5.40	32.90	27.50	
	5.70	14.70	9.00	
	5.70	24.90	19.20	
	5.70	32.30	26.60	
	4.50	30.20	25.70	
	4.50	42.40	37.90	
	4.50	59.80	55.30	
	7.20	17.60	10.40	
	7.20	26.70	19.50	
	7.20	43.40	36.20	
	6.20	37.50	31.30	
	6.20	44.70	38.50	
	6.20	64.90	58.70	
	4.90	16.00	11.10	
	4.90	32.40	27.50	
	4.90	45.00	40.10	
Triticum	0.17	1.18	1.02	Tuna et al. 2008
aestivum	0.17	2.42	2.25	
	0.09	0.26	0.17	
	0.09	0.48	0.39	
	0.02	0.73	0.71	
	0.02	1.98	1.96	
	0.00	0.12	0.12	

	0.00	0.38	0.38	
	0.10	0.93	0.83	
	0.10	1.96	1.86	
	0.08	0.21	0.13	
	0.08	0.40	0.32	
	0.02	0.84	0.83	
	0.02	1.52	1.50	
	0.00	0.18	0.18	
	0.00	0.31	0.31	
Brassica	0.66	2.42	1.76	Barreto et al. 2017
oleracea	0.84	4.59	3.75	
	0.51	1.07	0.56	
	0.55	1.80	1.26	
	0.37	3.30	2.93	
	1.08	0.95	-0.13	
Oryza sativa	36.90	80.80	43.90	Marxen et al. 2016
Oryza sativa	15.27	35.68	20.41	Fu et al. 2012
	14.16	28.24	14.08	
	3.22	5.26	2.04	
	5.89	6.38	0.49	
Triticum	1.12	4.20	3.08	Ahmad 2014
aestivum	1.68	4.48	2.80	
	1.40	4.76	3.36	
	1.12	4.76	3.64	
	1.68	5.04	3.36	
	1.40	4.76	3.36	
Vitis vinifera	2.63	2.76	0.13	Soylemezoglu et al.
	2.43	3.39	0.96	2009
	1.98	2.16	0.18	

	3.12	3.65	0.53	
	3.69	4.01	0.32	
	3.38	4.55	1.17	
Cucumis	1.90	9.80	7.90	Bityutskii et al. 2014
sativus	1.60	7.50	5.90	
	1.80	8.60	6.80	
	1.60	8.80	7.20	
	1.60	14.00	12.40	
	1.40	15.70	14.30	
	1.60	16.00	14.40	
	1.50	15.10	13.60	
Oryza sativa	14.00	18.67	4.67	Shi et al. 1996
	20.53	25.20	4.67	
	20.53	23.33	2.80	
	18.20	23.80	5.60	
	74.20	78.87	4.67	
	77.00	75.13	-1.87	
	72.80	76.53	3.73	
	72.33	75.13	2.80	
Oryza sativa	40.97	57.07	16.10	Chen et al. 2011b
	39.20	54.97	15.77	
	34.91	39.81	4.90	
	38.64	46.06	7.42	
	34.91	41.25	6.35	
	32.81	34.67	1.87	
	21.98	25.01	3.03	
	21.56	22.49	0.93	
	19.60	21.37	1.77	
	38.97	56.75	17.78	

	38.73	53.34	14.61	
	33.32	38.45	5.13	
	39.01	46.29	7.28	
	36.54	43.07	6.53	
	32.95	35.56	2.61	
	20.72	23.19	2.47	
	20.86	21.51	0.65	
	19.18	20.86	1.68	
Oryza sativa	0.30	41.55	41.25	Osuna-Canizaler et al.
	0.40	39.65	39.25	1991
	0.20	31.40	31.20	
	0.40	55.40	55.00	
	0.25	53.60	53.35	
	0.30	54.50	54.20	
Oryza sativa	14.90	53.00	38.10	Ma and Takahashi
	14.40	53.40	39.00	1993
	15.70	53.10	37.40	
	0.50	53.40	52.90	
	0.20	4.30	4.10	
Triticum	5.00	5.10	0.10	Gunes et al. 2007
aestivum	5.00	6.51	1.51	
	5.00	7.43	2.43	
Oryza sativa	1.32	8.2	6.88	Ming et al. 2012
	3.41	24.94	21.53	
	1.36	6.25	4.89	
	3.73	18.4	14.67	
Triticum	0.76	1.65	0.89	Pei et al. 2010
aestivum	0.54	1.11	0.57	
Mean			12.59	

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