Silicon availability modifies nutrient use efficiency and content, C:N:P stoichiometry, and productivity of winter wheat (*Triticum aestivum* L.)

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Supplementary Information

Table S1 Variation in concentration of Si, nutrients and nutrient stoichiometry in substrate and plant tissue of *Triticum aestivum* L. cv. Akteur (mmol g^{-1} $AFDM^{-1}$). Values are means ± SD; different letters indicate significant differences (^{abc} for $p < 0.001$, ^{de} for $p < 0.05$).

		soil	root	culm	leaf sheath	leaf blade	grain
silicon	Si-0	0.01 ± 0.01 ^{a}	0.001 ± 0.001 ^{a}	0.01 ± 0.00 ^{a}	0.06 ± 0.01 ^{a}	0.11 ± 0.02 ^{a}	0.005 ± 0.002
	Si-1	0.08 ± 0.01 ^{a}	0.016 ± 0.003 ^{a}	0.03 ± 0.02 ^{ab}	0.13 ± 0.01 ^{a}	0.21 ± 0.02 ^{a}	0.003 ± 0.001
	Si-10	0.19 ± 0.01 ^{a}	0.060 ± 0.022 ^{a}	0.11 ± 0.01 ^{b}	0.56 ± 0.06 ^{b}	0.60 ± 0.08 ^{b}	0.006 ± 0.003
	Si-50	0.96 ± 0.19 ^{b}	0.172 ± 0.034 ^{b}	0.40 ± 0.05 ^{c}	1.52 ± 0.19 ^{c}	2.28 ± 0.15 ^{c}	0.005 ± 0.003
carbon	Si-0	40.1 ± 0.5 ^{b}	39.2 ± 0.6	39.7 ± 0.2 ^{b}	38.4 ± 0.1 ^{bc}	38.5 ± 0.2 ^{ab}	35.8 ± 0.3
	Si-1	37.3 ± 0.5 ^{ab}	39.9 ± 0.7	39.4 ± 0.2 ^{ab}	38.8 ± 0.1 ^{c}	39.0 ± 0.1 ^{b}	35.6 ± 0.8
	Si-10	37.2 ± 0.9 ^{a}	39.0 ± 0.4	39.3 ± 0.1 ^{ab}	38.2 ± 0.1 ^{ab}	40.4 ± 0.2 ^{c}	35.4 ± 0.9
	Si-50	36.6 ± 1.1 ^{a}	39.4 ± 0.2	38.7 ± 0.2 ^{a}	37.8 ± 0.1 ^{a}	38.3 ± 0.2 ^{a}	35.0 ± 1.6
nitrogen	Si-0	0.74 ± 0.02	0.55 ± 0.07	0.10 ± 0.01	0.17 ± 0.01 ^{d}	0.37 ± 0.02 ^{b}	1.29 ± 0.04
	Si-1	0.69 ± 0.01	0.49 ± 0.04	0.11 ± 0.03	0.20 ± 0.01 ^{e}	0.39 ± 0.02 ^{b}	1.26 ± 0.06
	Si-10	0.70 ± 0.01	0.59 ± 0.05	0.11 ± 0.00	0.20 ± 0.03 ^{e}	0.17 ± 0.01 ^{a}	1.26 ± 0.04
	Si-50	0.72 ± 0.04	0.50 ± 0.10	0.14 ± 0.02	0.18 ± 0.01 ^{de}	0.36 ± 0.02 ^{b}	1.20 ± 0.07
phosphorus	Si-0	0.012 ± 0.001	0.013 ± 0.001 ^{d}	0.003 ± 0.000 ^{d}	0.013 ± 0.004	0.009 ± 0.001 ^{a}	0.092 ± 0.008
	Si-1	0.013 ± 0.001	0.021 ± 0.002 ^{e}	0.005 ± 0.002 ^{de}	0.014 ± 0.002	0.049 ± 0.005 ^{b}	0.097 ± 0.008
	Si-10	0.014 ± 0.002	0.022 ± 0.003 ^{e}	0.006 ± 0.002 ^{de}	0.017 ± 0.002	0.059 ± 0.015 ^{b}	0.100 ± 0.002
	Si-50	0.012 ± 0.001	0.018 ± 0.002 ^{e}	0.007 ± 0.003 ^{e}	0.016 ± 0.001	0.053 ± 0.009 ^{b}	0.098 ± 0.004
C:N	Si-0	54 ± 1	72 ± 9	397 ± 42	233 ± 18 ^{e}	104 ± 4 ^{a}	27.7 ± 0.6 ^{d}
	Si-1	54 ± 1	82 ± 7	366 ± 88	192 ± 14 ^{d}	101 ± 5 ^{a}	28.2 ± 0.8 ^{de}
	Si-10	53 ± 1	67 ± 6	354 ± 8	192 ± 25 ^{d}	237 ± 11 ^{b}	28.1 ± 0.5 ^{de}
	Si-50	51 ± 4	81 ± 17	291 ± 44	215 ± 11 ^{de}	106 ± 7 ^{a}	29.3 ± 0.3 ^{e}
C:P	Si-0	3245 ± 223	2928 ± 105 ^{b}	15289 ± 1518 ^{e}	3216 ± 811	4248 ± 642 ^{b}	391 ± 37
	Si-1	2807 ± 262	1967 ± 263 ^{ab}	9693 ± 3468 ^{d}	2772 ± 474	805 ± 89 ^{a}	369 ± 24
	Si-10	2762 ± 527	1827 ± 304 ^{a}	6857 ± 2123 ^{d}	2225 ± 265	714 ± 155 ^{a}	355 ± 8
	Si-50	2951 ± 119	2166 ± 316 ^{ab}	6216 ± 2279 ^{d}	2442 ± 164	742 ± 110 ^{a}	359 ± 15
N:P	Si-0	60 ± 4	41 ± 4 ^{e}	39 ± 8 ^{e}	14 ± 4	41 ± 9 ^{b}	14.1 ± 1.4 ^{e}
	Si-1	52 ± 5	24 ± 3 ^{d}	26 ± 7 ^{de}	15 ± 3	8 ± 1 ^{a}	13.1 ± 0.6 ^{de}
	Si-10	52 ± 9	28 ± 6 ^{d}	19 ± 6 ^{d}	12 ± 3	3 ± 1 ^{a}	12.6 ± 0.2 ^{de}
	Si-50	58 ± 6	28 ± 9 ^{d}	22 ± 11 ^{de}	11 ± 1	7 ± 1 ^{a}	12.3 ± 0.6 ^{d}

Table S2 Variation in concentration of Si, nutrients and nutrient stoichiometry in flag leaf tissue of *Triticum aestivum* L. cv. Akteur (mmol g^{-1} $AFDM^{-1}$). Values are means ± SD; different letters indicate significant differences (^{abc} for $p < 0.001$, ^{de} for $p < 0.05$).

		flag leaf sheath		flag leaf blade	
silicon	Si-0	0.07 ± 0.01	a	0.15 ± 0.04	a
	Si-1	0.13 ± 0.01	a	0.28 ± 0.05	a
	Si-10	0.42 ± 0.04	b	0.74 ± 0.05	b
	Si-50	1.58 ± 0.04	c	3.65 ± 0.55	c
carbon	Si-0	39.1 ± 0.2	e	38.3 ± 0.4	b
	Si-1	39.2 ± 0.1	e	39.0 ± 0.6	b
	Si-10	38.1 ± 1.0	de	38.7 ± 0.1	b
	Si-50	37.8 ± 0.4	d	35.6 ± 0.4	a
nitrogen	Si-0	0.22 ± 0.03		0.38 ± 0.02	e
	Si-1	0.20 ± 0.02		0.39 ± 0.02	e
	Si-10	0.20 ± 0.01		0.38 ± 0.02	e
	Si-50	0.19 ± 0.01		0.32 ± 0.02	d
phosphorus	Si-0	0.02 ± 0.01		0.04 ± 0.003	b
	Si-1	0.02 ± 0.02		0.03 ± 0.004	ab
	Si-10	0.01 ± 0.00		0.03 ± 0.004	ab
	Si-50	0.01 ± 0.00		0.02 ± 0.004	a
C:N	Si-0	179 ± 22		100 ± 4	d
	Si-1	203 ± 25		101 ± 4	d
	Si-10	187 ± 15		102 ± 5	de
	Si-50	200 ± 8		111 ± 4	e
C:P	Si-0	2566 ± 1549		1100 ± 113	d
	Si-1	2924 ± 1767		1277 ± 158	d
	Si-10	3536 ± 744		1295 ± 149	d
	Si-50	3328 ± 212		2004 ± 469	e
N:P	Si-0	14.8 ± 9.8		11.0 ± 1.0	d
	Si-1	13.8 ± 7.3		12.6 ± 1.3	d
	Si-10	18.9 ± 3.9		12.7 ± 1.6	d
	Si-50	16.6 ± 0.8		18.0 ± 4.1	e

Table S3 Total* concentration (mg g^{-1} DM^{-1}) of selected elements in the substrate prior to fertilization. Values are means ± SD.

aluminum (Al)	17.84 ± 0.49
calcium (Ca)	18.47 ± 0.28
iron (Fe)	11.02 ± 0.33
potassium (K)	2.25 ± 0.11
magnesium (Mg)	2.05 ± 0.08
manganese (Mn)	0.12 ± 0.00
phosphorus (P)	0.71 ± 0.01

*digested in a microwave digestion system (CEM Mars5, CEM Corporation, Matthews, NC, USA) at 180 °C in 3 ml HNO_3, 1.5 ml HF and 3 ml H_3BO_3

Figure S2 Element concentration in grains and flag leaf blades of *Triticum aestivum* L. cv. Akteur (mg g^{-1} $AFDM^{-1}$, Si-0) at harvest. Values are means (bars) ± SD (whiskers).