Supplement of

Silicon uptake and isotope fractionation dynamics by crop species

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Figure S 1: Temporal evolution of nutrient concentrations during the hydroponic growth of the different plant species. Concentration (Fe, K, Mg, Ca, P, S, Na in µg·g⁻¹) are based on the mean of the three replicated containers, uncertainty shown is 1 standard deviation of those replicated containers.
Figure S 2: Representative SEM-EDX micrograph of Si precipitates (phytoliths) in mustard roots extracted from dried root samples. See SEM-EDX analysis of mustard root phytoliths for detailed extraction and measurement methods.
|                                | Concentration measurements | Si isotope ratio measurements |
|--------------------------------|----------------------------|------------------------------|
| Instrument                     | Varian 720ES ICP-OES       | ThermoFisher Neptune Plus   |
| Spray chamber                  | cyclonic, glass            | APEX                         |
| Nebuliser                      | concentric, glass          | concentric, PFA              |
| Sample uptake rate             | ca. 2 ml/min (pumped:15 rpm)| 160 µL/min                   |
| Cones                          | standard cone              | N-sampler / H-skimmer        |
| Plasma RF power                | 1.0 kW                     | 1200 W                       |
| Ar cool gas                    | 15 L/min                   | 15 L/min                     |
| Ar aux gas                     | 1.5 L/min                  | 0.8 L/min                    |
| Ar nebuliser pressure /flow rate\(^a\) | 280 -320 kPa               | 1.0 L/min                    |
| Analysis integration time      | 10 s                       | 4 s                          |
| Integration replicates per analysis | 3                          | 30                           |
| Rinse time between samples    | 60 s (pumped at 50 rpm), 0.3 M HNO\(_3\) | 160 s, 0.1 M HCl             |
| Analytes (wavelengths in nm for ICP-OES or isotopes for MC-ICP-MS) | Ca 422.673, Fe 238.204, K 769.897, Mg 280.270, Na 588.995, Si 288.158, S 181.972, P 213.618 | \(^{24}\)Mg, \(^{25}\)Mg, \(^{26}\)Mg \(^{28}\)Si, \(^{29}\)Si, \(^{30}\)Si medium mass resolution mode: Δm/m (5%/95% intensity limits): >5000 |

\(^a\)Optimised during each analytical session

**Table S1:** Instrument settings for concentration and silicon isotope ratio measurements.
| ERM-CD281 | BHVO-2 |
|-----------|--------|
| $\delta^{29}\text{Si}/^{28}\text{Si}$ | $\delta^{29}\text{Si}/^{28}\text{Si}$ | $\delta^{30}\text{Si}/^{28}\text{Si}$ | $\delta^{30}\text{Si}/^{28}\text{Si}$ | 2 s | 2 s |
| -0.12 | -0.14 | 0.04 | 0.06 | -0.25 | -0.26 | 0.05 | 0.07 |
| -0.18 | -0.13 | 0.05 | 0.04 | -0.33 | -0.29 | 0.06 | 0.07 |
| -0.16 | -0.18 | 0.04 | 0.04 | -0.26 | -0.30 | 0.05 | 0.06 |
| -0.19 | -0.18 | 0.05 | 0.04 | -0.24 | -0.32 | 0.07 | 0.06 |
| -0.15 | -0.22 | 0.05 | 0.05 | -0.27 | -0.35 | 0.05 | 0.07 |
| -0.19 | -0.15 | 0.05 | 0.05 | -0.28 | -0.29 | 0.07 | 0.06 |
| -0.15 | -0.27 | 0.06 | 0.14 | -0.18 | -0.40 | 0.07 | 0.15 |
| -0.25 | -0.27 | 0.04 | 0.08 | -0.45 | -0.25 | 0.05 | 0.09 |
| -0.26 | -0.17 | 0.04 | 0.05 | -0.47 | -0.24 | 0.05 | 0.07 |
| -0.28 | -0.11 | 0.05 | 0.05 | -0.44 | -0.27 | 0.07 | 0.07 |
| -0.27 | -0.16 | 0.05 | 0.05 | -0.46 | -0.26 | 0.07 | 0.07 |
| -0.31 | -0.11 | 0.08 | 0.14 | -0.42 | -0.23 | 0.07 | 0.09 |
| -0.25 | -0.14 | 0.06 | 0.06 | -0.38 | -0.27 | 0.07 | 0.10 |
| -0.17 | -0.14 | 0.04 | 0.06 | -0.29 | -0.30 | 0.06 | 0.06 |
| -0.17 | -0.17 | 0.04 | 0.06 | -0.29 | -0.29 | 0.06 | 0.06 |
| -0.18 | -0.18 | 0.05 | 0.05 | -0.32 | -0.22 | 0.07 | 0.07 |
| -0.14 | -0.14 | 0.05 | 0.05 | -0.35 | -0.31 | 0.07 | 0.07 |
| -0.19 | -0.18 | 0.04 | 0.05 | -0.35 | -0.29 | 0.06 | 0.07 |
| -0.18 | -0.18 | 0.05 | 0.05 | -0.31 | -0.29 | 0.06 | 0.07 |
| -0.15 | -0.15 | 0.05 | 0.05 | -0.29 | -0.29 | 0.06 | 0.06 |
| -0.13 | -0.13 | 0.05 | 0.05 | -0.29 | -0.29 | 0.06 | 0.06 |
| -0.16 | -0.16 | 0.06 | 0.06 | -0.26 | -0.26 | 0.07 | 0.07 |
| -0.22 | -0.22 | 0.05 | 0.05 | -0.32 | -0.27 | 0.07 | 0.07 |
| -0.21 | -0.21 | 0.05 | 0.05 | -0.21 | -0.21 | 0.07 | 0.07 |
| -0.16 | -0.16 | 0.04 | 0.04 | -0.29 | -0.29 | 0.05 | 0.05 |
| -0.16 | -0.16 | 0.04 | 0.04 | -0.33 | -0.33 | 0.05 | 0.05 |
| -0.20 | -0.20 | 0.04 | 0.04 | -0.31 | -0.31 | 0.06 | 0.06 |
| -0.13 | -0.13 | 0.06 | 0.06 | -0.25 | -0.25 | 0.09 | 0.09 |
| -0.16 | -0.16 | 0.05 | 0.05 | -0.35 | -0.35 | 0.06 | 0.06 |
| -0.17 | -0.17 | 0.04 | 0.04 | -0.24 | -0.24 | 0.07 | 0.07 |
| -0.18 | -0.18 | 0.05 | 0.05 | -0.32 | -0.32 | 0.07 | 0.07 |
| -0.18 | -0.18 | 0.05 | 0.05 | -0.30 | -0.30 | 0.07 | 0.07 |
| -0.17 | -0.17 | 0.05 | 0.05 | -0.36 | -0.36 | 0.07 | 0.07 |
| -0.13 | -0.13 | 0.04 | 0.04 | -0.25 | -0.25 | 0.05 | 0.05 |
| -0.12 | -0.12 | 0.04 | 0.04 | -0.29 | -0.29 | 0.04 | 0.04 |
| -0.15 | -0.15 | 0.06 | 0.06 | -0.29 | -0.29 | 0.06 | 0.06 |
| -0.09 | -0.09 | 0.04 | 0.04 | -0.26 | -0.26 | 0.07 | 0.07 |
| -0.16 | -0.16 | 0.04 | 0.04 | -0.27 | -0.27 | 0.05 | 0.05 |
| -0.15 | -0.15 | 0.04 | 0.04 | -0.23 | -0.23 | 0.06 | 0.06 |

Table S2: Individually repeated analysis of BHVO-2 and ERM-CD281 for their silicon isotope composition.
| Mustard   | Ca (µg/g) | Fe (µg/g) | K (µg/g) | Mg (µg/g) | P (µg/g) | S (µg/g) | Si (µg/g) | δ²⁸Si | 2 SD |
|----------|-----------|-----------|----------|-----------|----------|----------|-----------|-------|------|
| Pot 1    | 64.2      | 4.6       | 210.8    | 14.3      | 20.4     | 21.2     | 49.3      | -0.23 | 0.12 |
| Pot 4    | 64.3      | 4.6       | 214.8    | 14.3      | 20.9     | 21.6     | 49.8      | -0.19 | 0.06 |
| Pot 7    | 65.0      | 4.7       | 216.1    | 14.4      | 21.2     | 21.6     | 49.5      | -0.15 | 0.06 |
| Spring Wheat | Pot 2 | 64.3      | 4.6       | 213.2    | 14.3      | 20.7     | 21.3     | 49.9   | -0.18 | 0.03 |
|           | Pot 5    | 64.5      | 4.7       | 214.0    | 14.3      | 20.8     | 21.6     | 49.4   | -0.18 | 0.13 |
|           | Pot 8    | 64.8      | 4.6       | 215.5    | 14.2      | 21.0     | 21.7     | 49.2   | -0.24 | 0.07 |
| Tomato   | Pot 3    | 64.9      | 4.7       | 213.3    | 14.4      | 20.9     | 21.7     | 49.4   | -0.20 | 0.08 |
|           | Pot 6    | 64.5      | 4.7       | 215.4    | 14.4      | 21.1     | 21.6     | 49.5   | -0.25 | 0.10 |
|           | Pot 9    | 64.7      | 4.7       | 214.7    | 14.2      | 21.1     | 21.7     | 49.4   | -0.23 | 0.02 |
| Average  |          |           |          |          |          |          |          |       |      |

Table S3: Starting composition (major element concentration (in µg g⁻¹) and silicon isotopic composition) of the nutrient solutions for the individual pots.

The Table S4 is on the following pages.

Table S4: Dry weight, major element concentration (in mg·g⁻¹) and Si isotope composition (in ‰) of the plants separated into shoot and root.

The Table S5 is on the following pages.

Table S5: Composition (major element concentration (in µg g⁻¹) and silicon isotopic composition) of the weekly sampled nutrient solutions for the individual pots. See Table S3 for the starting composition (week 0).
Table S4: Dry weight, major element concentration (in mg∙g⁻¹) and Si isotope composition (in ‰) of the plants separated into shoot and root.

| Mustard | Plant ID | [g] | mg/g | mg/g | mg/g | mg/g | mg/g | mg/g | mg/g | % NBS28 | 2 s / *95 % CI | δ²⁸Si | δ²⁸Si |
|---------|----------|-----|------|------|------|------|------|------|------|---------|----------------|--------|--------|
| Pot 1   | Roots    | 19-5-1R-S1 | 0.96 | 3.9  | 1.0  | 23.3 | 2.6  | 5.9  | 4.0  | 13.2 | -0.83 | 0.17                | -0.62 | 0.17  |
|         |          | 19-5-1R-S2 | 1.48 | 2.2  | 0.5  | 29.6 | 1.9  | 4.6  | 3.3  | 11.2 | -1.15 | 0.05                | -0.94 | 0.05  |
|         |          | 19-5-1R-S3 | 0.58 | 2.3  | 0.5  | 27.7 | 1.2  | 4.5  | 3.3  | 11.3 | -0.92 | 0.05                | -0.72 | 0.05  |
|         |          | 19-5-1R-S4 | 0.05 | 4.2  | 0.9  | 15.2 | 0.9  | 3.2  | 2.2  | 5.0  | -0.73 | 0.12                | -0.53 | 0.12  |
|         | Shoot    | 19-5-1S-S1 | 4.12 | 13.5 | 0.10 | 51.4 | 3.7  | 4.3  | 4.6  | 0.90  | -0.27 | 0.08                | -0.06 | 0.06  |
|         |          | 19-5-1S-S2 | 12.12 | 18.7 | 0.07 | 46.0 | 3.7  | 5.1  | 3.7  | 1.12  | -0.38 | 0.04                | -0.18 | 0.04  |
|         |          | 19-5-1S-S3 | 4.43 | 20.5 | 0.06 | 44.9 | 3.0  | 5.0  | 3.6  | 0.90  | -0.50 | 0.08                | -0.29 | 0.08  |
|         |          | 19-5-1S-S4 | 0.63 | 18.4 | 0.15 | 53.1 | 3.0  | 8.1  | 7.4  | 0.89  | -0.38 | 0.08                | -0.17 | 0.08  |
| Pot 4   | Roots    | 19-5-4R-S1 | 0.71 | 3.3  | 0.67 | 15.2 | 1.8  | 3.2  | 3.7  | 7.23  | -0.59 | 0.04                | -0.39 | 0.04  |
|         |          | 19-5-4R-S2 | 0.62 | 2.7  | 0.37 | 15.5 | 1.6  | 4.4  | 2.8  | 4.75  | -1.26 | 0.08                | -1.06 | 0.08  |
|         |          | 19-5-4R-S3 | 0.61 | 2.6  | 0.40 | 17.8 | 1.8  | 4.1  | 1.6  | 9.00  | -1.32 | 0.07                | -1.11 | 0.07  |
|         |          | 19-5-4R-S4 | 1.58 | 2.1  | 0.38 | 18.1 | 1.6  | 4.1  | 2.1  | 8.19  | -0.82 | 0.04                | -0.62 | 0.04  |
|         | Shoot    | 19-5-4S-S1 | 5.84 | 34.1 | 0.10 | 50.9 | 5.1  | 4.0  | 4.4  | 1.68  | -0.32 | 0.11                | -0.11 | 0.11  |
|         |          | 19-5-4S-S2 | 3.08 | 12.4 | 0.12 | 47.1 | 3.7  | 5.7  | 4.2  | 0.95  | -0.25 | 0.18                | -0.05 | 0.18  |
|         |          | 19-5-4S-S3 | 4.83 | 11.0 | 0.08 | 44.4 | 3.3  | 4.9  | 2.2  | 1.11  | -0.33 | 0.05                | -0.12 | 0.05  |
|         |          | 19-5-4S-S4 | 10.54 | 9.0  | 0.08 | 47.5 | 3.0  | 5.3  | 2.8  | 1.04  | -0.18 | 0.08                | 0.02  | 0.08  |
| Pot 7   | Roots    | 19-5-7R-S1 | 1.98 | 1.6  | 0.21 | 18.5 | 1.6  | 3.7  | 2.3  | 3.08  | -1.19 | 0.07                | -0.99 | 0.07  |
|         |          | 19-5-7R-S2 | 0.22 | 2.7  | 0.89 | 24.1 | 1.2  | 3.1  | 3.5  | 17.95 | -0.74 | 0.07                | -0.54 | 0.07  |
|         |          | 19-5-7R-S3 | 0.80 | 2.0  | 0.16 | 21.2 | 0.9  | 3.1  | 3.4  | 3.85  | -1.05 | 0.10                | -0.84 | 0.10  |
|         |          | 19-5-7R-S4 | 2.15 | 1.4  | 0.19 | 24.8 | 1.1  | 3.2  | 2.8  | 8.07  | -1.07 | 0.09                | -0.86 | 0.09  |
|         | Shoot    | 19-5-7S-S1 | 8.90 | 6.9  | 0.08 | 37.7 | 2.0  | 3.1  | 1.6  | 0.53  | -0.07 | 0.09                | 0.13  | 0.09  |
|         |          | 19-5-7S-S2 | 0.93 | 4.6  | 0.06 | 44.2 | 1.9  | 2.5  | 1.7  | 0.52  | -0.04 | 0.10                | 0.17  | 0.10  |
|         |          | 19-5-7S-S3 | 5.30 | 17.8 | 0.06 | 48.4 | 2.5  | 4.7  | 3.2  | 0.77  | -0.38 | 0.09                | -0.18 | 0.09  |
|         |          | 19-5-7S-S4 | 14.40 | 12.7 | 0.06 | 52.4 | 2.3  | 3.0  | 1.8  | 1.25  | 0.07  | 0.06                | 0.28  | 0.06  |
| Average | Roots    |     |     |     |     |     |     |     |     |     |       |                      |       |       |
|         |          |     |     |     |     |     |     |     |     |     |       |                      |       |       |
|         | Shoot    |     |     |     |     |     |     |     |     |     |       |                      |       |       |
|         |          |     |     |     |     |     |     |     |     |     |       |                      |       |       |
| Sum     | Plants   |     |     |     |     |     |     |     |     |     |       |                      | 86.88 |       |

* Uncertainty based on 95 % CI
| Spring Wheat | Plant ID | dry mass [g] | Ca [mg/g] | Fe [mg/g] | K [mg/g] | Mg [mg/g] | P [mg/g] | S [mg/g] | Si [mg/g] | δ30Si NBS28 | δ30Si Nutrient solution | 2 s / *95 % CI Nutrient solution | 2 s / *95 % CI Nutrient solution |
|-------------|---------|--------------|-----------|-----------|----------|-----------|---------|---------|---------|-------------|------------------------|-----------------------------|-----------------------------|
| Roots Pot 2 | 19-5-2R-W1 | 0.8 | 4.6 | 0.46 | 62.9 | 1.1 | 5.2 | 1.9 | 1.31 | -0.68 | 0.14 | -0.48 | 0.14 |
| Shoot      | 19-5-2S-W1 | 3.7 | 6.7 | 0.31 | 95.1 | 1.7 | 7.6 | 3.6 | 22.18 | -0.21 | 0.09 | -0.01 | 0.05 |
| Roots Pot 5 | 19-5-5R-W1 | 0.51 | 4.9 | 1.11 | 54.4 | 1.9 | 5.4 | 1.4 | 1.10 | -1.45 | 0.13 | -1.25 | 0.13 |
| Shoot      | 19-5-5S-W1 | 3.31 | 7.0 | 0.13 | 66.2 | 2.0 | 8.9 | 3.0 | 23.69 | 0.22 | 0.03 | 0.43 | 0.03 |
| Roots Pot 8 | 19-5-8R-W1 | 0.62 | 3.9 | 0.47 | 63.1 | 1.6 | 8.5 | 1.5 | 2.10 | -1.00 | 0.09 | -0.79 | 0.09 |
| Shoot      | 19-5-8S-W1 | 3.42 | 7.3 | 0.15 | 68.0 | 1.6 | 10.1 | 2.8 | 23.25 | -0.09 | 0.06 | 0.12 | 0.06 |
| Average Plants | 48.92 | | | | | | | | | | | | |

Table S4: Dry weight, major element concentration (in mg·g⁻¹) and Si isotope composition (in ‰) of the plants separated into shoot and root.
| Tomato | Plant ID      | dry mass [g] | Ca [mg/g] | Fe [mg/g] | K [mg/g] | Mg [mg/g] | P [mg/g] | S [mg/g] | Si [mg/g] | δ30Si NBS28 | 2 s / 95% CI | δ30Si nutrient solution | 2 s / 95% CI |
|--------|---------------|--------------|-----------|-----------|----------|----------|----------|----------|-----------|--------------|---------------|---------------------------|---------------|
|        |               |              |           |           |          |          |          |          |           |              |               |                           |               |
|        |    Roots      | 19-5-3R-T1   | 0.03      | 8.7       | 1.53     | 65.4     | 4.6      | 6.1      | 5.7       | 7.41         | -0.60         | 0.10          | -0.39        | 0.10          |
|        |               | 19-5-3R-T2   | 1.08      | 7.3       | 0.99     | 81.1     | 3.8      | 7.5      | 2.7       | 1.77         | -0.03         | 0.04          | 0.17         | 0.04          |
|        |               | 19-5-3R-T3   | 0.40      | 6.8       | 1.18     | 58.5     | 4.6      | 7.6      | 2.6       | 4.32         | -0.46         | 0.03          | -0.25        | 0.03          |
|        |               | 19-5-3R-T4   | 0.44      | 6.8       | 2.48     | 72.5     | 3.4      | 9.1      | 2.8       | 3.80         | -0.19         | 0.01          | 0.02         | 0.01          |
|        | Shoot         | 19-5-3S-T1   | 0.17      | 19.5      | 0.11     | 79.8     | 3.2      | 11.5     | 2.9       | 2.45         | -0.30         | 0.09          | -0.10        | 0.09          |
|        |               | 19-5-3S-T2   | 6.18      | 24.9      | 0.13     | 60.2     | 3.1      | 7.9      | 4.6       | 1.21         | -0.77         | 0.01          | -0.56        | 0.01          |
|        |               | 19-5-3S-T3   | 2.13      | 28.9      | 0.28     | 50.7     | 5.5      | 10.9     | 4.8       | 1.38         | -0.42         | 0.09          | -0.21        | 0.09          |
|        |               | 19-5-3S-T4   | 3.33      | 21.5      | 0.15     | 70.1     | 3.9      | 8.3      | 4.6       | 1.23         | -0.81         | 0.06          | -0.60        | 0.06          |
|        |               | 19-5-3S-T1   | 0.17      | 19.5      | 0.11     | 79.8     | 3.2      | 11.5     | 2.9       | 2.45         | -0.30         | 0.09          | -0.10        | 0.09          |
|        |               | 19-5-3S-T2   | 6.18      | 24.9      | 0.13     | 60.2     | 3.1      | 7.9      | 4.6       | 1.21         | -0.77         | 0.01          | -0.56        | 0.01          |
|        |               | 19-5-3S-T3   | 2.13      | 28.9      | 0.28     | 50.7     | 5.5      | 10.9     | 4.8       | 1.38         | -0.42         | 0.09          | -0.21        | 0.09          |
|        |               | 19-5-3S-T4   | 3.33      | 21.5      | 0.15     | 70.1     | 3.9      | 8.3      | 4.6       | 1.23         | -0.81         | 0.06          | -0.60        | 0.06          |
|        |               | 19-5-3R-T1   | 0.03      | 8.7       | 1.53     | 65.4     | 4.6      | 6.1      | 5.7       | 7.41         | -0.60         | 0.10          | -0.39        | 0.10          |
|        |               | 19-5-3R-T2   | 1.08      | 7.3       | 0.99     | 81.1     | 3.8      | 7.5      | 2.7       | 1.77         | -0.03         | 0.04          | 0.17         | 0.04          |
|        |               | 19-5-3R-T3   | 0.40      | 6.8       | 1.18     | 58.5     | 4.6      | 7.6      | 2.6       | 4.32         | -0.46         | 0.03          | -0.25        | 0.03          |
|        |               | 19-5-3R-T4   | 0.44      | 6.8       | 2.48     | 72.5     | 3.4      | 9.1      | 2.8       | 3.80         | -0.19         | 0.01          | 0.02         | 0.01          |
|        |               | 19-5-3S-T1   | 0.17      | 19.5      | 0.11     | 79.8     | 3.2      | 11.5     | 2.9       | 2.45         | -0.30         | 0.09          | -0.10        | 0.09          |
|        |               | 19-5-3S-T2   | 6.18      | 24.9      | 0.13     | 60.2     | 3.1      | 7.9      | 4.6       | 1.21         | -0.77         | 0.01          | -0.56        | 0.01          |
|        |               | 19-5-3S-T3   | 2.13      | 28.9      | 0.28     | 50.7     | 5.5      | 10.9     | 4.8       | 1.38         | -0.42         | 0.09          | -0.21        | 0.09          |
|        |               | 19-5-3S-T4   | 3.33      | 21.5      | 0.15     | 70.1     | 3.9      | 8.3      | 4.6       | 1.23         | -0.81         | 0.06          | -0.60        | 0.06          |
|        |               | 19-5-3R-T1   | 0.03      | 8.7       | 1.53     | 65.4     | 4.6      | 6.1      | 5.7       | 7.41         | -0.60         | 0.10          | -0.39        | 0.10          |
|        |               | 19-5-3R-T2   | 1.08      | 7.3       | 0.99     | 81.1     | 3.8      | 7.5      | 2.7       | 1.77         | -0.03         | 0.04          | 0.17         | 0.04          |
|        |               | 19-5-3R-T3   | 0.40      | 6.8       | 1.18     | 58.5     | 4.6      | 7.6      | 2.6       | 4.32         | -0.46         | 0.03          | -0.25        | 0.03          |
|        |               | 19-5-3R-T4   | 0.44      | 6.8       | 2.48     | 72.5     | 3.4      | 9.1      | 2.8       | 3.80         | -0.19         | 0.01          | 0.02         | 0.01          |

**Table S4:** Dry weight, major element concentration (in mg·g⁻¹) and Si isotope composition (in ‰) of the plants separated into shoot and root.
|          | Ca µg/g | Fe µg/g | K µg/g | Mg µg/g | P µg/g | S µg/g | Si µg/g | δ30Si | % δNBS28 | 2 s |
|----------|---------|---------|--------|---------|--------|--------|---------|-------|----------|-----|
| Mustard  |         |         |        |         |        |        |         |       |          |     |
| Pot 1    | 63.3    | 4.4     | 210.5  | 14.0    | 20.2   | 21.4   | 47.3    | -0.27 | 0.09     |
| Pot 4    | 62.0    | 4.4     | 206.2  | 13.9    | 19.7   | 21.3   | 47.3    | -0.17 | 0.02     |
| Pot 7    | 61.7    | 4.4     | 205.2  | 13.8    | 19.4   | 20.6   | 46.6    | -0.25 | 0.02     |
| Pot 10   | 59.0    | 14.0    | 14.0   | 20.0    | 21.3   | 47.0   | -0.26   | 0.09   |
| Mustard  |         |         |        |         |        |        |         |       |          |     |
| Pot 1    | 63.9    | 4.5     | 209.1  | 14.2    | 19.6   | 21.5   | 47.1    | -0.29 | 0.06     |
| Pot 5    | 64.6    | 4.5     | 214.1  | 14.3    | 20.4   | 21.9   | 46.8    | -0.27 | 0.05     |
| Mustard  |         |         |        |         |        |        |         |       |          |     |
| Pot 5    | 63.8    | 4.4     | 211.5  | 14.2    | 20.2   | 21.8   | 47.2    | -0.33 | 0.03     |
| Mustard  |         |         |        |         |        |        |         |       |          |     |
| Pot 9    | 63.8    | 4.5     | 213.6  | 14.0    | 20.6   | 21.8   | 47.0    | -0.22 | 0.05     |

Table S5: Composition (major element concentration (in µg g⁻¹) and silicon isotopic composition) of the weekly sampled nutrient solutions for the individual pots. See Table S3 for the starting composition (week 0).
Table S 6: Weekly transpiration (in g), determined by weighing the pots without the plants. The transpired water was replenished weekly with ultrapure water.

|               | Difference between and | Week 0 | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 |
|---------------|------------------------|--------|--------|--------|--------|--------|--------|--------|
|               |                        | [g]    | [g]    | [g]    | [g]    | [g]    | [g]    |        |
| **Mustard**   |                        |        |        |        |        |        |        |        |
| Pot 1         |                        | 407.5  | 671.2  | 1842.2 | 2707.5 | 2863.3 | 2277.8 |        |
| Pot 4         |                        | 239    | 929.9  | 2469.8 | 3397.6 | 2627.5 | 1673.4 |        |
| Pot 7         |                        | 137.8  | 449.4  | 1500.7 | 3119.5 | 3413.4 | 2152.7 |        |
| **Spring Wheat** |                      |        |        |        |        |        |        |        |
| Pot 2         |                        | 231.1  | 374.7  | 791.1  | 1416   | 2083.7 | 2471.3 |        |
| Pot 5         |                        | 147.6  | 331.3  | 914.9  | 1816.3 | 2306.7 | 2422.1 |        |
| Pot 8         |                        | 133.5  | 189    | 474.7  | 996.6  | 1576.9 | 1756.8 |        |
| **Tomato**    |                        |        |        |        |        |        |        |        |
| Pot 3         |                        | 206.7  | 316.2  | 526.6  | 772.6  | 998.9  | 951.6  |        |
| Pot 6         |                        | 224.1  | 233.2  | 352.6  | 625.2  | 913    | 1005.8 |        |
| Pot 9         |                        | 127.1  | 164.6  | 292.4  | 444.6  | 672.3  | 800.2  |        |

Methods

Method S1 Preparation of the nutrient solution

The nutrient solution was prepared from technical graded salts and dissolved in 10 L of ultrapure water. Macro nutrients 1.23 g MgSO₄·7H₂O, 3.54 g Ca(NO₃)₂·4H₂O, 0.33 g Ferric sodium EDTA, 3.6 g KNO₃, 1.1 g KCl and 0.82 g KH₂PO₄. Micro nutrients: 0.55 mg Al₂(SO₄)₃, 0.28 mg KJ, 0.55 mg TiO₂, 0.28 mg SnCl₂ 2H₂O, 0.28 mg LiCl, 0.39 mg MnCl₂ 4H₂O, 6.1 mg H₂BO₃, 0.55 mg ZnSO₄, 0.55 mg CuSO₄ 5H₂O, 0.55 mg NiSO₄ 6H₂O, 0.55 mg Co(NO₃)₂ 6H₂O, 0.05 mg As₂O₃, 0.28 mg BaCl₂, 0.05 mg Bi(NO₃)₃, 0.05 mg Rb₂SO₄, 0.28 mg K₂CrO₄, 0.05 mg KF, 0.05 mg PbCl₂, 0.05 mg HgCl₂, 0.28 mg MoO₃, 0.05 mg H₂SeO₄, 0.28 mg SrSO₄, 0.05 mg H₂WO₄, 0.05 mg VCl₂). Silicon: 2.03 g Na₂O₇Si₃·3H₂O. pH was adjusted to 6.0 using HNO₃ (PA grade).

Method S2 Plant germination and growth conditions

Plant seeds were germinated in Petri dishes containing a nutrient solution of half the concentration than the solution used for growth experiments (Methods S1) and in the absence of sodium silicate trihydrate (Na₂O₇Si₃·3H₂O). After cotyledons germinated, seeds and roots were clamped in a foam disk (3 cm high with a diameter of 2.5 cm) and each seedling (foam disk) transferred to a PP vial (50 mL centrifuge tube) filled with half-concentrated nutrient solution without sodium silicate trihydrate. Two weeks later, the foam disks including young plants were transferred to the experimental containers, four plants per container, 3 replicated container per species. These containers were opaque plastic containers 25.5 cm high, 20.5 cm deep and 20.5 cm wide (with a wall thickness of 0.5 cm). In order to reduce evaporation and to prevent algae growth in the nutrient solution, the containers were closed with opaque lids which had holes for the plants (foam disks). Germination and plant cultivation were performed in a growth chamber under controlled conditions. The temperature in the growth chamber during the day and night was maintained at 18 °C for 14 h and at 15 °C for 10 h, respectively, and the daylight intensity at the top of...
the container was adjusted to 350 µE m⁻² s⁻¹) at the start of the experiment. The relative humidity was maintained at approximately 65 %. For comparability, the cultivation conditions for the three species were the same, knowingly they are not equally suited for all species. The relatively low temperatures may have inhibited the growth of the more thermophilic tomato, while the conditions for mustard and summer wheat were close to their optimum. To supply the roots with oxygen, perforated PVC tubes were used to inject (approx. 6 L) room air into the nutrient solution twice a day for two hours each. The transpired water was replenished weekly with ultrapure water.

Method S3 Dried plant and nutrient residue digestion and chromatographic purification of Si

The crucibles containing the sample (dried down nutrient solution or charred plant material with approximately 400 mg NaOH) were placed in a high temperature furnace at 750 °C for 15 min. After cooling down the crucibles were cleaned externally with ultrapure water and placed in precleaned 50mL PP centrifuge tubes and covered with ultrapure water for 24 h. Thereafter, the crucibles were placed in an ultra-sonic bath for 30 min to facilitate the dissolution of the fusion cake. This solution #1 was decanted and collected in precleaned PP flask. The silver crucibles were then stored for ~3 h in a 0.03 M HCl solution and this solution #2 was combined with solution #1 in the PP flask. Using concentrated HCl the pH was adjusted to 1.5. If the concentration was expected to be above 60 µg g⁻¹ additional 0.03 M HCl solution was added. 1:10-fold dilution was analysed by ICP-OES to determining the Si content. Approximately 60 µg Si from are loaded onto precleaned and preconditioned columns using a cation exchange resin (1.5 mL, DOWEX 50WX8, Sigma-Aldrich) and eluted using 5 mL ultrapure water. The cation exchange resin is then regenerated using HCl and HNO₃. The Si yield of the fusion procedure and the column chemistry was determined in a 1:10-fold dilution by ICP-OES.