# Supplementary Data

**Table S1.** Pearson correlation coefficient matrix for the concentrations of elements in leaf blades and veins.

| | Blades | | | | | | | | | | Veins | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **N** | **P** | **K** | **Ca** | **Mg** | **Mn** | **Fe** | **Cu** | **Zn** | **B** | **N** | **P** | **K** | **Ca** | **Mg** | **Mn** | **Fe** | **Cu** | **Zn** | **B** |
| Blade N | 1 | | | | | | | | | | | | | | | | | | | |
| Blade P | 0.8586 * | 1 | | | | | | | | | | | | | | | | | | |
| Blade K | −0.6506 | −0.6790 | 1 | | | | | | | | | | | | | | | | | |
| Blade Ca | −0.3493 | −0.3952 | 0.9314 ** | 1 | | | | | | | | | | | | | | | | |
| Blade Mg | 0.6958 | 0.3248 | −0.7099 | −0.6269 | 1 | | | | | | | | | | | | | | | |
| Blade Mn | −0.5310 | −0.1342 | 0.5996 | 0.5760 | −0.9683 ** | 1 | | | | | | | | | | | | | | |
| Blade Fe | −0.5885 | −0.8150 * | 0.8977 * | 0.7973 | −0.3791 | 0.2043 | 1 | | | | | | | | | | | | | |
| Blade Cu | −0.1269 | −0.2600 | 0.6522 | 0.6830 | −0.2793 | 0.3051 | 0.5309 | 1 | | | | | | | | | | | | |
| Blade Zn | −0.6693 | −0.4294 | 0.8559 * | 0.8085 | −0.9598 ** | 0.9092 * | 0.5789 | 0.3973 | 1 | | | | | | | | | | | |
| Blade B | −0.2815 | −0.5137 | 0.5776 | 0.5951 | −0.1494 | −0.0107 | 0.7617 | −0.0037 | 0.3719 | 1 | | | | | | | | | | |
| Vein N | −0.0576 | 0.1604 | 0.0488 | 0.0186 | −0.2957 | 0.3171 | −0.1357 | 0.3044 | 0.1479 | −0.5317 | 1 | | | | | | | | | |
| Vein P | 0.4856 | 0.7796 | −0.2173 | 0.0126 | −0.1948 | 0.3628 | −0.5150 | 0.0764 | 0.0836 | −0.4948 | 0.6438 | 1 | | | | | | | | |
| Vein K | −0.3245 | −0.5951 | 0.8685 * | 0.8693 * | −0.2830 | 0.1756 | 0.9273 ** | 0.7610 | 0.5077 | 0.6298 | −0.0411 | −0.3012 | 1 | | | | | | | |
| Leaf vein Ca | −0.1223 | −0.5305 | 0.3966 | 0.3213 | 0.2518 | −0.4018 | 0.6747 | 0.5074 | −0.0950 | 0.3693 | 0.1499 | −0.3988 | 0.7200 | 1 | | | | | | |
| Vein Mg | 0.5383 | 0.0673 | −0.4032 | −0.3341 | 0.9220 ** | −0.9593 ** | −0.0029 | −0.1311 | −0.7883 | 0.2058 | −0.4164 | −0.4049 | 0.0668 | 0.5160 | 1 | | | | | |
| Vein Mn | −0.6446 | −0.2860 | 0.6715 | 0.6031 | −0.9754 | 0.9836 *** | 0.3056 | 0.3461 | 0.9321 ** | 0.0450 | 0.2312 | 0.1977 | 0.2484 | −0.3373 | −0.9331 ** | 1 | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *** | | | | | | | | | | | | | | | |
| Vein | −0.13 | −0.10 | 0.587 | 0.711 | −0.48 | 0.398 | 0.528 | 0.142 | 0.599 | 0.645 | 0.187 | 0.276 | 0.516 | 0.212 | −0.24 | 0.33 | 1 | | | |
| Fe | 46 | 23 | 4 | 3 | 20 | 1 | 3 | 2 | 3 | 8 | 1 | 0 | 1 | 2 | 77 | 21 | | | | |
| Vein | −0.68 | −0.54 | 0.938 | 0.858 | −0.88 | 0.816 | 0.703 | 0.644 | 0.943 | 0.311 | 0.264 | 0.010 | 0.684 | 0.173 | −0.67 | 0.86 | 0.52 | 1 | | |
| Cu | 86 | 85 | 1 ** | 7 * | 09 * | 3 * | 4 | 1 | 0 ** | 5 | 3 | 7 | 3 | 2 | 71 | 25 * | 04 | | | |
| Vein | −0.76 | −0.51 | 0.807 | 0.670 | −0.93 | 0.875 | 0.527 | 0.528 | 0.909 | 0.088 | 0.422 | 0.082 | 0.467 | 0.041 | −0.81 | 0.91 | 0.38 | 0.953 | 1 | |
| Zn | 50 | 30 | 9 | 0 | 23 ** | 4 * | 9 | 0 | 8 * | 9 | 7 | 9 | 8 | 1 | 72 * | 36 * | 69 | 5 ** | | |
| Vein | −0.13 | 0.311 | 0.081 | 0.146 | −0.64 | 0.788 | −0.32 | −0.03 | 0.531 | −0.28 | 0.033 | 0.462 | −0.31 | −0.85 | −0.81 | 0.74 | 0.00 | 0.337 | 0.42 | 1 |
| B | 13 | 2 | 6 | 7 | 34 | 1 | 75 | 26 | 4 | 93 | 2 | 8 | 33 | 01 * | 26 * | 39 | 38 | 9 | 91 | |

*, **, and ***indicate significant at 5%, 1% and 1‰, respectively.

**Table S2.** PCA for leaf gas exchange and related physiological parameters of upper, middle and lower leaves.

| Variables | Upper Leaves | | | | | Middle Leaves | | | Lower Leaves | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PC1 | PC2 | PC3 | PC4 | PC5 | PC1 | PC2 | PC3 | PC1 | PC2 |
| **Leaf gas exchange** | | | | | | | | | | |
| $CO_2$ assimilation | 0.464 | 0.748 | −0.296 | −0.149 | 0.279 | 0.842 | 0.248 | −0.425 | 0.995 | −0.064 |
| $g_s$ | 0.374 | 0.715 | −0.537 | −0.161 | −0.075 | 0.799 | 0.437 | −0.313 | 0.964 | 0.026 |
| $C_i$ | −0.073 | 0.426 | −0.575 | 0.040 | −0.609 | −0.622 | 0.434 | 0.505 | −0.963 | 0.195 |
| Transpiration rate | 0.514 | 0.307 | −0.736 | −0.160 | −0.127 | 0.769 | 0.320 | −0.290 | 0.957 | 0.025 |
| **Chl a fluorescence parameters** | | | | | | | | | | |
| $F_o$ | −0.856 | 0.399 | 0.192 | −0.120 | 0.223 | −0.992 | 0.067 | −0.065 | −0.983 | 0.107 |
| $F_m$ | −0.506 | 0.262 | 0.774 | −0.124 | 0.127 | 0.701 | −0.644 | 0.201 | 0.769 | 0.010 |
| $F_v$ | −0.338 | 0.190 | 0.880 | −0.112 | 0.082 | 0.868 | −0.449 | 0.159 | 0.953 | −0.056 |
| $M_o$ | −0.854 | 0.114 | 0.171 | 0.320 | −0.298 | −0.975 | 0.156 | 0.006 | −0.977 | 0.037 |
| ABS/RC | −0.889 | 0.157 | 0.130 | 0.267 | −0.240 | −0.970 | 0.197 | −0.019 | −0.977 | 0.197 |
| $F_v/F_o$ | 0.791 | −0.344 | 0.448 | 0.048 | −0.201 | 0.973 | −0.136 | 0.127 | 0.979 | −0.050 |
| $DI_o$/RC | −0.933 | 0.290 | −0.182 | 0.102 | 0.000 | −0.947 | 0.259 | −0.063 | −0.979 | 0.180 |
| $DI_o$/ABS | −0.787 | 0.352 | −0.434 | −0.060 | 0.208 | −0.958 | 0.235 | −0.107 | −0.989 | 0.112 |
| $F_v/F_m$ | 0.796 | −0.328 | 0.439 | 0.040 | −0.205 | 0.957 | −0.237 | 0.106 | 0.989 | −0.113 |
| $RE_o$/ABS | 0.251 | 0.878 | 0.356 | −0.016 | 0.171 | 0.978 | −0.068 | 0.094 | 0.991 | −0.089 |
| $ET_o$/ABS | 0.931 | −0.179 | 0.034 | −0.247 | 0.169 | 0.975 | −0.148 | 0.047 | 0.950 | 0.127 |
| $PI_{abs,total}$ | 0.594 | 0.656 | 0.434 | −0.054 | 0.141 | 0.942 | −0.024 | 0.130 | 0.999 | 0.017 |
| **Leaf pigments** | | | | | | | | | | |
| Chl a | 0.296 | 0.502 | −0.159 | 0.766 | 0.212 | 0.853 | 0.476 | −0.003 | 0.990 | 0.100 |
| Chl b | 0.393 | 0.646 | 0.275 | 0.545 | −0.153 | 0.794 | 0.491 | −0.084 | 0.994 | 0.018 |
| Chl a + b | 0.339 | 0.569 | −0.038 | 0.737 | 0.114 | 0.844 | 0.480 | −0.019 | 0.992 | 0.082 |
| Car | 0.040 | 0.883 | 0.096 | −0.429 | −0.099 | 0.662 | 0.577 | 0.456 | 0.951 | 0.286 |
| Chl a/b | −0.255 | −0.486 | −0.603 | 0.012 | 0.480 | 0.867 | 0.287 | 0.216 | 0.882 | 0.361 |
| Car/Chl | −0.130 | 0.624 | 0.077 | −0.743 | −0.155 | −0.297 | 0.171 | 0.878 | 0.197 | 0.965 |
| **Eigen value** | 7.724 | 5.717 | 4.118 | 2.538 | 1.238 | 16.264 | 2.594 | 1.792 | 19.566 | 1.342 |
| **Variation percent (%)** | 35.110 | 25.988 | 18.717 | 11.536 | 5.626 | 73.925 | 11.789 | 8.143 | 88.938 | 6.101 |