

Supplementary Table S1. Effects of nitrogen (N) availability on maize yield and its components at maturity¹.

| N treatment | Grain yield (g plant ⁻¹) | Row number per cob | Kernel number per row | Kernel weight (g kernel ⁻¹) |
|-------------|---|-----------------------|--------------------------|--|
| LN | 9.11±4.71 b | 5.3±1.8 b | 5.06±1.78 b | 1.24±1.10 a |
| MN | 66.10±9.99 a | 13.3±0.8 a | 19.50±2.59 a | 0.25±0.01 b |
| HN | 87.65±2.24 a | 14.7±0.8 a | 22.89±1.44 a | 0.26±0.00 b |

¹ Data are mean ± standard error ($n = 4$). Means with no letter in common indicate significant differences between N treatment for each parameter ($p < 0.05$). LN, low N; MN, medium N; HN, high N.

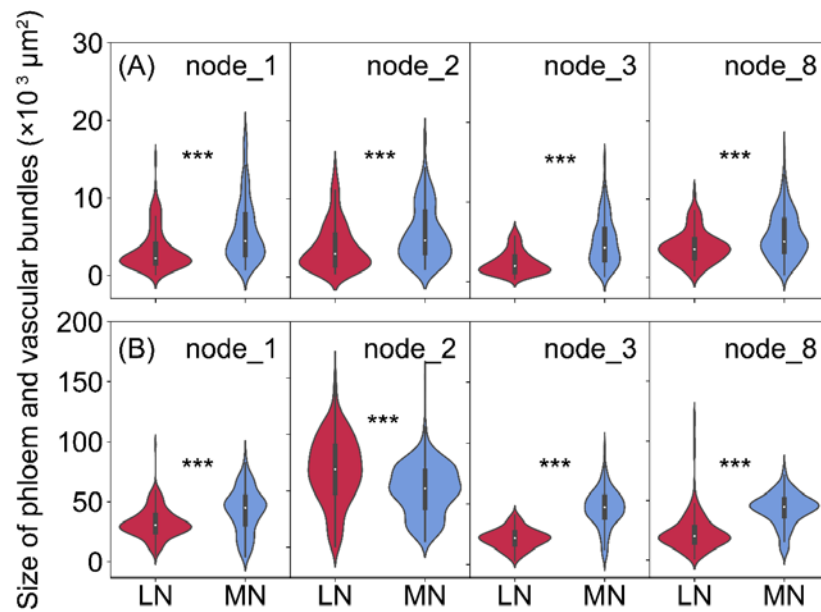
Supplementary Table S2. Effects of nitrogen (N) availability on the concentrations of soluble sugars (sum of fructose, glucose, and sucrose) in leaves and stem nodes at 62 days after sowing¹.

| N treatment | Sugar concentrations in different tissues (mg g ⁻¹) | | | | |
|----------------|---|---------------|--------------|--------------|--------------|
| | 8 th leaf | Node 1 | Node 2 | Node 3 | Node 8 |
| LN | 19.11±1.92 b | 65.14±7.78 b | 46.64±4.38 b | 52.25±4.59 a | 35.95±2.59 b |
| MN | 46.60±2.17 a | 141.01±4.95 a | 64.97±5.60 a | 60.14±7.13 a | 64.80±2.20 a |
| HN | 49.12±6.97 a | 123.40±6.11 a | 63.60±5.41 a | 50.86±9.05 a | 67.47±5.43 a |

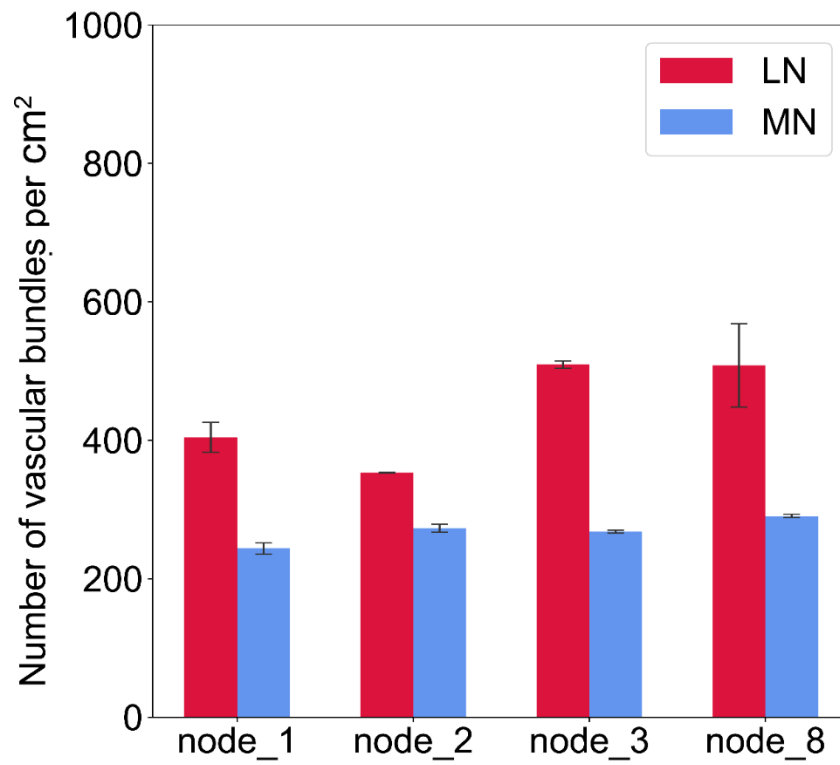
¹ Data are mean ± standard error ($n = 4$). Means with no letter in common indicate significant differences between N treatment for each parameter ($p < 0.05$). LN, no nitrogen application; MN, 0.15 g N kg⁻¹ soil; HN, 0.30 g N kg⁻¹ soil.

Supplementary Table S3. List of primers used in this research.

| Gene | Primer sequence (5'-3') |
|-----------------------------------|-----------------------------|
| <i>ZmSWEET3a</i> (GRMZM2G179679) | Fw: CATTTACAGCAGATGCAATCGA |
| | Re: AGGCAGTTTCTTAAGACTCTCC |
| <i>ZmSWEET4a</i> (GRMZM2G000812) | Fw: TGTACGCCATCTACTACAAGTC |
| | Re: ATATTGGTGTGCGATCGTCACTT |
| <i>ZmSWEET4b</i> (GRMZM2G144581) | Fw: AACTGTGCTCAATCGTTTCTTC |
| | Re: GAGAGTGTGCTATTTTGCTAGC |
| <i>ZmSWEET13a</i> (GRMZM2G173669) | Fw: TGTGTTGGGAAATTCTTGTGAC |
| | Re: GATGACGTTACCTAGTAGACCG |
| <i>ZmSWEET13b</i> (GRMZM2G021706) | Fw: CATCATACAACACCAGCAACTG |
| | Re: CGACACAAAAAGGGTGATACAG |
| <i>ZmSWEET13c</i> (GRMZM2G179349) | Fw: GTCATCTCCTTCATGACCTTCC |
| | Re: GAAGTACATGACCACGTAGACG |
| <i>ZmSUT1</i> (GRMZM2G034302) | Fw: GGCACAAGTGGTTTCCGTTT |
| | Re: TTTGCCTTTGTGGGGAGGTT |
| <i>ZmSUT2</i> (GRMZM2G307561) | Fw: TCCATCCACTCTAGGTCTCTAG |
| | Re: GAATCGAATCGCTGAGTTGTTT |
| <i>ZmSUT4</i> (GRMZM2G145107) | Fw: AACATTTTGACCAGAATGAGGC |
| | Re: ATTTGGATCCCCATGGTAAACT |
| <i>ZmTublin</i> | Fw: GCTATCCTGTGATCTGCCCTGA |
| | Re: CGCCAAACTTAATAACCCAGTA |



Supplementary Figure S1. The size of phloem (A to D) and vascular bundles (E to H) in the internodes (2 cm above node_1, node_2, node_3, and node_8 of maize plants at 62 days after sowing under low and medium N supply. The solid line and dash line within each box represent the median and mean values of all data. The top and bottom edges represent the 75 and 25 percentiles, and the top and bottom bars represent the 95 and 5 percentiles of all data, respectively. ***, $p < 0.001$.



Supplementary Figure S2. The number of vascular bundles per unit area in the internodes (2 cm above node_1, node_2, node_3, and node_8 of maize plants at 62 days after sowing under low and medium N supply.