

Additional file 2: Table S1. Physiological measurements from plants under 12h/12h and 08h/16h light/dark regimes. Twenty-seven random plants from each population were chosen for accessing +1 leaves length and width; and plant height in days 0 and 30.

| Day 0 | | | | | | | |
|--------------------|-------------|------------|-------------------|--------------------|-------------|------------|-------------------|
| 12h/12h light/dark | | | Plant height (cm) | 08h/16h light/dark | | | Plant height (cm) |
| +1 leaf | | | | +1 leaf | | | |
| Plant id | Length (cm) | Width (cm) | | Plant id | Length (cm) | Width (cm) | |
| 1 | 33.0 | 1.0 | 41.2 | 1 | 40.1 | 1.0 | 70.2 |
| 3 | 21.3 | 0.9 | 46.0 | 2 | 47.0 | 1.2 | 58.5 |
| 4 | 16.9 | 1.2 | 38.5 | 3 | 23.0 | 1.1 | 32.0 |
| 5 | 27.2 | 1.0 | 34.3 | 5 | 17.1 | 1.4 | 39.2 |
| 6 | 30.2 | 0.6 | 40.0 | 6 | 39.5 | 1.2 | 58.5 |
| 7 | 26.7 | 1.1 | 45.6 | 7 | 34.0 | 0.8 | 47.0 |
| 8 | 40.1 | 1.0 | 53.5 | 8 | 18.5 | 1.0 | 33.0 |
| 9 | 50.3 | 1.2 | 62.5 | 9 | 51.0 | 1.4 | 64.0 |
| 10 | 43.8 | 1.2 | 57.5 | 10 | 41.0 | 1.1 | 63.0 |
| 12 | 46.0 | 1.3 | 67.0 | 12 | 52.0 | 1.7 | 64.0 |
| 13 | 37.2 | 1.0 | 64.0 | 13 | 57.0 | 1.4 | 97.0 |
| 14 | 29.8 | 1.1 | 39.0 | 14 | 29.5 | 1.4 | 69.8 |
| 15 | 57.3 | 1.3 | 81.9 | 15 | 40.0 | 1.3 | 59.5 |
| 16 | 43.6 | 0.6 | 56.0 | 16 | 32.8 | 1.4 | 49.5 |
| 17 | 38.2 | 0.7 | 60.4 | 17 | 17.1 | 0.8 | 33.5 |
| 18 | 64.0 | 1.5 | 80.2 | 18 | 22.8 | 1.1 | 38.9 |
| 20 | 54.5 | 1.3 | 67.9 | 19 | 48.5 | 1.4 | 75.0 |
| 21 | 24.0 | 1.2 | 33.0 | 20 | 38.9 | 1.2 | 72.6 |
| 22 | 42.2 | 1.1 | 65.4 | 21 | 36.1 | 1.2 | 51.2 |
| 23 | 20.5 | 0.9 | 32.4 | 23 | 54.2 | 1.3 | 70.0 |
| 24 | 18.9 | 0.9 | 29.3 | 24 | 30.2 | 0.9 | 44.2 |
| 25 | 44.2 | 1.4 | 44.2 | 25 | 29.8 | 1.4 | 43.9 |
| 26 | 53.0 | 1.4 | 77.2 | 26 | 26.9 | 0.9 | 55.4 |
| 27 | 32.1 | 1.4 | 47.8 | 27 | 44.8 | 1.2 | 54.8 |
| 28 | 43.1 | 1.0 | 55.0 | 28 | 60.2 | 1.2 | 78.0 |
| 29 | 51.2 | 1.1 | 68.1 | 29 | 51.0 | 1.0 | 65.7 |
| 30 | 31.8 | 1.0 | 55.1 | 30 | 29.2 | 0.9 | 29.2 |
| Average | 37.8 | 1.1 | 53.4 | Average | 37.5 | 1.2 | 56.2 |

Table S1 cont.:

| Day 30 | | | | | | | |
|--------------------|-------------|------------|-------------------|--------------------|-------------|------------|-------------------|
| 12h/12h light/dark | | | | 08h/16h light/dark | | | |
| +1 leaf | | | Plant height (cm) | +1 leaf | | | Plant height (cm) |
| Plant id | Length (cm) | Width (cm) | | Plant id | Length (cm) | Width (cm) | |
| 1 | 33.1 | 0.9 | 49.6 | 1 | 39.8 | 1.0 | 110.4 |
| 3 | 21.0 | 0.9 | 79.4 | 2 | 46.3 | 1.3 | 102.0 |
| 4 | 17.1 | 1.2 | 49.0 | 3 | 23.1 | 1.1 | 51.4 |
| 5 | 27.5 | 1.0 | 41.9 | 5 | 16.9 | 1.1 | 49.5 |
| 6 | 30.8 | 0.6 | 75.0 | 6 | 39.2 | 1.2 | 82.1 |
| 7 | 27.9 | 1.1 | 49.1 | 7 | 34.0 | 0.8 | 83.2 |
| 8 | 41.2 | 1.0 | 77.5 | 8 | 50.0 | 1.4 | 125.0 |
| 9 | 50.4 | 1.2 | 109.6 | 9 | 51.2 | 1.3 | 106.0 |
| 10 | 44.1 | 1.1 | 103.5 | 10 | 41.6 | 1.1 | 101.0 |
| 12 | 46.1 | 1.2 | 104.2 | 12 | 52.1 | 1.8 | 104.2 |
| 13 | 38.9 | 1.1 | 105.6 | 13 | 57.2 | 1.4 | 134.0 |
| 14 | 29.8 | 1.1 | 67.4 | 14 | 40.0 | 1.5 | 116.7 |
| 15 | 57.6 | 1.2 | 121.0 | 15 | 39.0 | 1.3 | 87.0 |
| 16 | 44.2 | 0.9 | 91.2 | 16 | 33.9 | 1.4 | 70.2 |
| 17 | 38.8 | 0.9 | 98.0 | 17 | 17.8 | 0.8 | 38.9 |
| 18 | 63.9 | 1.5 | 121.0 | 18 | 22.0 | 1.1 | 60.0 |
| 20 | 54.6 | 1.3 | 105.5 | 19 | 48.1 | 1.4 | 114.0 |
| 21 | 26.3 | 1.2 | 47.0 | 20 | 39.1 | 1.2 | 114.6 |
| 22 | 42.5 | 1.1 | 116.6 | 21 | 35.6 | 1.2 | 90.2 |
| 23 | 20.6 | 0.9 | 57.1 | 23 | 54.2 | 1.4 | 126.0 |
| 24 | 18.6 | 0.9 | 48.5 | 24 | 30.1 | 1.0 | 67.6 |
| 25 | 44.5 | 1.4 | 100.3 | 25 | 30.0 | 1.3 | 71.6 |
| 26 | 53.0 | 1.3 | 111.0 | 26 | 26.5 | 1.0 | 84.2 |
| 27 | 31.8 | 1.4 | 74.2 | 27 | 45.1 | 1.2 | 97.0 |
| 28 | 43.2 | 1.0 | 92.9 | 28 | 60.5 | 1.2 | 128.0 |
| 29 | 50.7 | 1.1 | 106.8 | 29 | 45.0 | 1.1 | 87.5 |
| 30 | 32.5 | 1.1 | 93.0 | 30 | 29.1 | 0.9 | 73.1 |
| Average | 38.2 | 1.1 | 85.0 | Average | 38.8 | 1.2 | 91.7 |

Additional file 2: Table S2. ANOVA tables from comparisons between +1 leaf length, width and plant height in days 0 and 30.

| +1 leaf length day 0 | | | | | | |
|----------------------------|--------------|------------|----------------|-----------------|----------------|---------------|
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 1021.1 | 37.8185 | 159.553 | | |
| 08h/16h | 27 | 1012.2 | 37.4889 | 156.105 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 1.46685 | 1 | 1.46685 | 0.00929 | 0.92357 | 4.02663 |
| Within Groups | 8207.11 | 52 | 157.829 | | | |
| Total | 8208.57 | 53 | | | | |
| +1 leaf width day 0 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 29.4 | 1.08889 | 0.05487 | | |
| 08h/16h | 27 | 31.9 | 1.18148 | 0.04926 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 0.11574 | 1 | 0.11574 | 2.22298 | 0.14201 | 4.02663 |
| Within Groups | 2.70741 | 52 | 0.05207 | | | |
| Total | 2.82315 | 53 | | | | |
| Total plant height day 0 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 1443 | 53.4444 | 227.597 | | |
| 08h/16h | 27 | 1517.6 | 56.2074 | 270.085 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 103.059 | 1 | 103.059 | 0.41415 | 0.5227 | 4.02663 |
| Within Groups | 12939.7 | 52 | 248.841 | | | |
| Total | 13042.8 | 53 | | | | |

Table S2 cont.:

| +1 leaf length day 30 | | | | | | |
|----------------------------|--------------|------------|----------------|-----------------|----------------|---------------|
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 1030.7 | 38.1741 | 156.85 | | |
| 08h/16h | 27 | 1047.4 | 38.7926 | 139.972 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 5.16463 | 1 | 5.16463 | 0.0348 | 0.85274 | 4.02663 |
| Within Groups | 7717.39 | 52 | 148.411 | | | |
| Total | 7722.56 | 53 | | | | |
| +1 leaf width day 30 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 29.6 | 1.0963 | 0.03806 | | |
| 08h/16h | 27 | 32.5 | 1.2037 | 0.04883 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 0.15574 | 1 | 0.15574 | 3.58459 | 0.06389 | 4.02663 |
| Within Groups | 2.25926 | 52 | 0.04345 | | | |
| Total | 2.415 | 53 | | | | |
| Total plant heigth day 30 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| <i>Groups</i> | <i>Count</i> | <i>Sum</i> | <i>Average</i> | <i>Variance</i> | | |
| 12h/12h | 27 | 2295.9 | 85.0333 | 666.716 | | |
| 08h/16h | 27 | 2475.4 | 91.6815 | 662.442 | | |
| ANOVA | | | | | | |
| <i>Source of Variation</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>P-value</i> | <i>F crit</i> |
| Between Groups | 596.671 | 1 | 596.671 | 0.89782 | 0.34775 | 4.02663 |
| Within Groups | 34558.1 | 52 | 664.579 | | | |
| Total | 35154.8 | 53 | | | | |

Additional file 2: Table S3. Dry mass measurements made at days 0 and 30. Plants were organized in intervals regarding the plant height and three representative plants were harvested from each diel condition to access root, leaves and leaf sheaths dry masses at day 0; and three other plants at day 30 for the same measurements.

| 12h/12h light/dark | | | | | 08h/16h light/dark | | | | |
|--------------------|------------|-----------------|-----------|-----------|--------------------|------------|-----------------|-----------|-----------|
| Dry mass | | | | | Dry mass | | | | |
| Plant | Leaves (g) | Leaf sheath (g) | Roots (g) | Total (g) | Plant | Leaves (g) | Leaf sheath (g) | Roots (g) | Total (g) |
| Day 0 | | | | | Day 0 | | | | |
| 1 | 0.58 | 0.73 | 0.42 | 1.73 | 1 | 0.35 | 0.51 | 0.25 | 1.11 |
| 2 | 0.18 | 0.24 | 0.25 | 0.67 | 2 | 0.84 | 0.97 | 0.71 | 2.52 |
| 3 | 0.84 | 1.17 | 1.14 | 3.15 | 3 | 0.10 | 0.25 | 0.22 | 0.57 |
| Day 30 | | | | | Day 30 | | | | |
| 1 | 0.40 | 0.21 | 0.07 | 0.68 | 1 | 0.32 | 0.57 | 0.25 | 1.14 |
| 2 | 1.10 | 1.16 | 0.78 | 3.04 | 2 | 1.04 | 0.98 | 0.69 | 2.70 |
| 3 | 1.52 | 1.46 | 0.86 | 3.84 | 3 | 1.33 | 1.02 | 0.44 | 2.79 |

Additional file 2: Table S4. ANOVA tables for data from dry mass measurements made at days 0 and 30.

| Leaves day 0 | | | | | | |
|----------------------|------------|------|------------|------------|---------|---------|
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Leaves 12h/12h | 3 | 1.6 | 0.532 | 0.109459 | | |
| Leaves 08h/16h | 3 | 1.3 | 0.43166667 | 0.14227233 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.01510017 | 1 | 0.01510017 | 0.1199705 | 0.74652 | 7.70865 |
| Within Groups | 0.50346267 | 4 | 0.12586567 | | | |
| Total | 0.51856283 | 5 | | | | |
| Leaf sheaths day 0 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Leaf sheaths 12h/12h | 3 | 2.15 | 0.71533333 | 0.21643333 | | |
| Leaf sheaths 08h/16h | 3 | 1.73 | 0.577 | 0.132303 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.02870417 | 1 | 0.02870417 | 0.16461816 | 0.70571 | 7.70865 |
| Within Groups | 0.69747267 | 4 | 0.17436817 | | | |
| Total | 0.72617683 | 5 | | | | |
| Roots day 0 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Roots 12h/12h | 3 | 1.81 | 0.60366667 | 0.22504933 | | |
| Roots 08h/16h | 3 | 1.18 | 0.39166667 | 0.07584933 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.067416 | 1 | 0.067416 | 0.4480977 | 0.5399 | 7.70865 |
| Within Groups | 0.60179733 | 4 | 0.15044933 | | | |
| Total | 0.66921333 | 5 | | | | |

Table S4 cont.:

| Total dry weight day 0 | | | | | | |
|------------------------|------------|------|-------------|------------|---------|---------|
| Anova: Single Factor | | | | | | |
| Total day 0 | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| total 12h | 3 | 5.55 | 1.851 | 1.545921 | | |
| total 08h | 3 | 4.2 | 1.400333333 | 1.01710933 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.30465067 | 1 | 0.30465067 | 0.23772693 | 0.65137 | 7.70865 |
| Within Groups | 5.12606067 | 4 | 1.28151517 | | | |
| Total | 5.43071133 | 5 | | | | |
| Leaves day 30 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Leaves 12h/12h | 3 | 3.02 | 1.006333333 | 0.31850233 | | |
| Leaves 08h/16h | 3 | 2.69 | 0.896333333 | 0.27218633 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.01815 | 1 | 0.01815 | 0.06145369 | 0.81642 | 7.70865 |
| Within Groups | 1.18137733 | 4 | 0.29534433 | | | |
| Total | 1.19952733 | 5 | | | | |
| Leaf sheaths day 30 | | | | | | |
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Leaf sheaths 12h/12h | 3 | 2.83 | 0.942333333 | 0.42678433 | | |
| Leaf sheaths 08h/16h | 3 | 2.56 | 0.854333333 | 0.06101433 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.011616 | 1 | 0.011616 | 0.04762621 | 0.83793 | 7.70865 |
| Within Groups | 0.97559733 | 4 | 0.24389933 | | | |
| Total | 0.98721333 | 5 | | | | |

Table S4 cont.:

| Roots day 30 | | | | | | |
|-------------------------|------------|------|------------|------------|---------|---------|
| Anova: Single Factor | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| Roots 12h/12h | 3 | 1.72 | 0.57266667 | 0.18960033 | | |
| Roots 08h/16h | 3 | 1.39 | 0.46166667 | 0.04841433 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.0184815 | 1 | 0.0184815 | 0.15529715 | 0.71363 | 7.70865 |
| Within Groups | 0.47602933 | 4 | 0.11900733 | | | |
| Total | 0.49451083 | 5 | | | | |
| Total dry weight day 30 | | | | | | |
| Anova: Single Factor | | | | | | |
| Total day 30 | | | | | | |
| SUMMARY | | | | | | |
| Groups | Count | Sum | Average | Variance | | |
| total 12h | 3 | 7.56 | 2.52133333 | 2.69892233 | | |
| total 08h | 3 | 6.64 | 2.21233333 | 0.86449433 | | |
| ANOVA | | | | | | |
| Source of Variation | SS | df | MS | F | P-value | F crit |
| Between Groups | 0.1432215 | 1 | 0.1432215 | 0.08038437 | 0.79085 | 7.70865 |
| Within Groups | 7.12683333 | 4 | 1.78170833 | | | |
| Total | 7.27005483 | 5 | | | | |

Additional file 2: Table S5. Cell wall components measurements accordingly to each ZT and photoperiod. Values are mean \pm SD, n=3.

| | | Cell wall components (mg/g Dry mass ⁻¹) | | | | | |
|-------------|-----------|---|-----------------|--------------------|--------------------|---------------------|--------------------|
| Photoperiod | Timepoint | Pectin | | Hemicelluloses | | Celluloses | |
| | | Leaf | Leaf sheath | Leaf | Leaf sheath | Leaf | Leaf sheath |
| 12h12h | ZT1 | 4.94 \pm 0.14 | 4.84 \pm 1.10 | 269.40 \pm 24.88 | 251.76 \pm 16.16 | 394.06 \pm 17.32 | 456.56 \pm 24.68 |
| | ZT6 | 4.66 \pm 0.75 | 5.06 \pm 1.72 | 207.97 \pm 51.93 | 252.11 \pm 4.54 | 398.06 \pm 76.66 | 522.45 \pm 41.87 |
| | ZT11 | 5.48 \pm 1.20 | 3.91 \pm 0.35 | 211.72 \pm 51.50 | 244.89 \pm 9.78 | 373.58 \pm 73.90 | 522.42 \pm 26.84 |
| | ZT13 | 5.67 \pm 0.56 | 4.21 \pm 0.36 | 255.43 \pm 46.63 | 259.75 \pm 10.33 | 343.83 \pm 44.67 | 499.35 \pm 37.74 |
| | ZT16 | 4.71 \pm 0.24 | 5.45 \pm 0.49 | 261.87 \pm 5.75 | 284.19 \pm 33.25 | 370.45 \pm 27.53 | 575.92 \pm 41.23 |
| | ZT20 | 4.53 \pm 0.91 | 3.67 \pm 0.38 | 222.28 \pm 54.89 | 218.93 \pm 22.15 | 382.21 \pm 105.89 | 508.79 \pm 9.62 |
| | ZT23 | 4.01 \pm 0.70 | 3.39 \pm 0.54 | 197.58 \pm 47.08 | 235.71 \pm 15.88 | 343.93 \pm 110.34 | 528.39 \pm 53.3 |
| 08h16h | ZT1 | 4.04 \pm 0.20 | 4.32 \pm 0.80 | 260.37 \pm 25.66 | 235.91 \pm 29.00 | 418.19 \pm 33.60 | 444.20 \pm 56.18 |
| | ZT4 | 5.86 \pm 0.52 | 4.98 \pm 0.74 | 191.01 \pm 30.11 | 220.98 \pm 12.79 | 335.48 \pm 68.40 | 438.15 \pm 20.54 |
| | ZT7 | 5.17 \pm 1.04 | 4.57 \pm 0.39 | 273.86 \pm 16.01 | 266.36 \pm 14.51 | 407.26 \pm 50.9 | 512.73 \pm 49.33 |
| | ZT9 | 4.02 \pm 0.29 | 5.10 \pm 0.46 | 211.67 \pm 22.12 | 271.94 \pm 13.46 | 320.33 \pm 23.77 | 563.54 \pm 35.24 |
| | ZT14 | 4.15 \pm 1.30 | 6.07 \pm 0.64 | 178.18 \pm 24.04 | 261.47 \pm 21.88 | 311.22 \pm 82.82 | 563.09 \pm 62.97 |
| | ZT19 | 5.91 \pm 0.44 | 5.01 \pm 0.05 | 244.44 \pm 33.80 | 232.54 \pm 5.41 | 454.04 \pm 55.90 | 416.85 \pm 36.67 |
| | ZT23 | 5.20 \pm 1.18 | 4.51 \pm 0.22 | 217.71 \pm 23.43 | 289.81 \pm 7.54 | 351.19 \pm 79.05 | 566.40 \pm 33.37 |

Additional file 2: Table 6. Significant differences (p-value < 0.05) between time points for each measured cell wall components in the leaf and leaf sheath in plants under 12h12h and 08h16h photoperiods.

| Photoperiod | Cell wall fraction | Comparison | p-value (Student's t-test) |
|--------------|----------------------------|--------------|-------------------------------|
| 12h12h | Leaf sheath pectin | ZT11 vs ZT16 | 0.0267 |
| | | ZT13 vs ZT16 | 0.0492 |
| | | ZT16 vs ZT20 | 0.0173 |
| | | ZT16 vs ZT23 | 0.0166 |
| | Leaf sheath cellulose | ZT1 vs ZT16 | 0.0341 |
| 08h16h | Leaf pectin | ZT1 vs ZT4 | 0.0263 |
| | | ZT1 vs ZT19 | 0.0146 |
| | | ZT4 vs ZT9 | 0.0201 |
| | | ZT9 vs ZT19 | 0.0104 |
| | Leaf hemicelluloses | ZT4 vs ZT7 | 0.0404 |
| | | ZT7 vs ZT9 | 0.0368 |
| | | ZT7 vs ZT14 | 0.0131 |
| | Leaf cellulose | ZT1 vs ZT9 | 0.0331 |
| | Leaf sheath hemicelluloses | ZT4 vs ZT7 | 0.0301 |
| | | ZT4 vs ZT9 | 0.0179 |
| | | ZT4 vs ZT23 | 0.0056 |
| | | ZT9 vs ZT19 | 0.0391 |
| | | ZT19 vs ZT23 | 0.0014 |
| | Leaf sheath cellulose | ZT4 vs ZT9 | 0.0194 |
| | | ZT4 vs ZT23 | 0.0151 |
| | | ZT9 vs ZT19 | 0.0152 |
| ZT19 vs ZT23 | | 0.0132 | |

Additional file 2: Table S7. Soluble sugars measurements accordingly to each ZT and photoperiod. Values are mean \pm SD, n=3.

| | | Soluble sugars (mg/g Dry mass ⁻¹) | | | | | |
|-------------|-----------|---|--------------------|-------------------|-------------------|------------------|------------------|
| Photoperiod | Timepoint | Total sugars | | Sucrose | | Reducing sugars | |
| | | Leaf | Leaf sheath | Leaf | Leaf sheath | Leaf | Leaf sheath |
| 12h12h | ZT1 | 72.51 \pm 14.64 | 100.84 \pm 33.42 | 55.83 \pm 4.83 | 67.65 \pm 14.25 | 9.30 \pm 1.48 | 10.88 \pm 2.14 |
| | ZT6 | 99.83 \pm 13.69 | 113.96 \pm 14.41 | 73.79 \pm 16.03 | 82.45 \pm 5.42 | 9.39 \pm 3.42 | 15.23 \pm 2.51 |
| | ZT11 | 101.76 \pm 9.98 | 108.51 \pm 33.07 | 97.45 \pm 6.10 | 80.01 \pm 14.16 | 8.35 \pm 0.48 | 11.56 \pm 1.48 |
| | ZT13 | 102.50 \pm 13.68 | 170.12 \pm 13.55 | 80.07 \pm 8.46 | 124.27 \pm 5.62 | 10.25 \pm 1.22 | 11.57 \pm 0.93 |
| | ZT16 | 80.64 \pm 1.87 | 157.16 \pm 8.99 | 72.41 \pm 2.19 | 88.87 \pm 1.69 | 8.71 \pm 1.56 | 10.87 \pm 0.45 |
| | ZT20 | 77.56 \pm 1.38 | 186.19 \pm 8.79 | 73.54 \pm 3.29 | 103.34 \pm 6.34 | 8.92 \pm 0.34 | 18.13 \pm 0.62 |
| | ZT23 | 65.22 \pm 4.27 | 113.35 \pm 15.45 | 70.24 \pm 8.18 | 61.27 \pm 19.39 | 9.90 \pm 2.40 | 8.47 \pm 1.79 |
| 08h16h | ZT1 | 69.35 \pm 4.71 | 66.84 \pm 13.17 | 68.66 \pm 3.89 | 43.23 \pm 4.00 | 8.76 \pm 1.89 | 5.54 \pm 0.31 |
| | ZT4 | 61.55 \pm 2.67 | 75.62 \pm 9.72 | 69.91 \pm 5.21 | 46.61 \pm 2.51 | 8.49 \pm 0.37 | 7.47 \pm 0.76 |
| | ZT7 | 82.30 \pm 8.33 | 76.59 \pm 8.48 | 71.56 \pm 5.27 | 53.09 \pm 5.79 | 11.52 \pm 1.13 | 8.55 \pm 2.16 |
| | ZT9 | 76.46 \pm 4.54 | 97.82 \pm 4.58 | 62.32 \pm 3.06 | 67.50 \pm 2.67 | 12.04 \pm 0.98 | 11.84 \pm 2.39 |
| | ZT14 | 88.56 \pm 6.12 | 80.26 \pm 11.99 | 79.65 \pm 9.61 | 66.16 \pm 12.98 | 9.89 \pm 0.74 | 9.83 \pm 1.67 |
| | ZT19 | 85.19 \pm 3.99 | 103.96 \pm 1.52 | 90.11 \pm 7.11 | 78.00 \pm 3.99 | 11.35 \pm 1.99 | 13.05 \pm 0.95 |
| | ZT23 | 57.19 \pm 2.81 | 68.11 \pm 4.13 | 64.45 \pm 2.26 | 51.42 \pm 3.85 | 9.23 \pm 0.28 | 14.21 \pm 2.64 |

Additional file 2: Table S8. Significant differences (p-value < 0.05) between time points for each measured soluble sugar in the leaf and leaf sheath in plants under 12h12h and 08h16h photoperiods (*Student's t-test).

| 12h12h | | | 8h16h | | | |
|-----------------------------|--------------|-------------|-----------------------------|----------------------|-------------|--------|
| Fraction | Comparison | p-value* | Fraction | Comparison | p-value* | |
| Leaf total sugars | ZT11 vs ZT23 | 0.0221 | | ZT1 vs ZT14 | 0.0272 | |
| | ZT16 vs ZT23 | 0.0225 | | ZT1 vs ZT19 | 0.0233 | |
| | ZT20 vs ZT23 | 0.0442 | | ZT1 vs ZT23 | 0.0462 | |
| Leaf sucrose | ZT1 vs ZT11 | 0.002 | Leaf total sugars | ZT4 vs ZT9 | 0.0242 | |
| | ZT1 vs ZT13 | 0.0355 | | ZT4 vs ZT14 | 0.0136 | |
| | ZT1 vs ZT16 | 0.025 | | ZT4 vs ZT19 | 0.0036 | |
| | ZT1 vs ZT20 | 0.0167 | | ZT7 vs ZT23 | 0.0396 | |
| | ZT11 vs ZT16 | 0.019 | | ZT9 vs ZT23 | 0.0112 | |
| | ZT11 vs ZT20 | 0.0156 | | ZT14 vs ZT23 | 0.0087 | |
| | ZT11 vs ZT23 | 0.0226 | | ZT19 vs ZT23 | 0.0019 | |
| Leaf sheath total sugars | ZT6 vs ZT13 | 0.016 | Leaf sucrose | ZT1 vs ZT19 | 0.0315 | |
| | ZT6 vs ZT16 | 0.0306 | | ZT4 vs ZT19 | 0.0358 | |
| | ZT6 vs ZT20 | 0.0068 | | ZT7 vs ZT19 | 0.0457 | |
| | ZT13 vs ZT23 | 0.018 | | ZT9 vs ZT19 | 0.0186 | |
| | ZT16 vs ZT20 | 0.031 | | ZT19 vs ZT23 | 0.0273 | |
| | ZT16 vs ZT23 | 0.0363 | | Leaf reducing sugars | ZT4 vs ZT9 | 0.0248 |
| | ZT20 vs ZT23 | 0.0087 | | | ZT9 vs ZT23 | 0.0466 |
| Leaf sheath sucrose | ZT1 vs ZT13 | 0.0191 | Leaf sheath total sugars | ZT7 vs ZT19 | 0.0411 | |
| | ZT6 vs ZT13 | 0.0016 | | ZT9 vs ZT23 | 0.0025 | |
| | ZT6 vs ZT20 | 0.0249 | | ZT19 vs ZT23 | 0.0029 | |
| | ZT11 vs ZT13 | 0.0338 | Leaf sheath sucrose | ZT1 vs ZT9 | 0.0034 | |
| | ZT13 vs ZT16 | 0.0079 | | ZT1 vs ZT19 | 0.0009 | |
| | ZT13 vs ZT20 | 0.0256 | | ZT4 vs ZT9 | 0.0013 | |
| | ZT13 vs ZT23 | 0.0357 | | ZT4 vs ZT19 | 0.0016 | |
| ZT1 vs ZT20 | 0.0327 | ZT7 vs ZT19 | | 0.0101 | | |
| ZT6 vs ZT23 | 0.0416 | ZT9 vs ZT19 | | 0.0437 | | |
| ZT11 vs ZT20 | 0.0138 | ZT9 vs ZT23 | | 0.011 | | |
| Leaf sheath reducing sugars | ZT13 vs ZT20 | 0.002 | ZT19 vs ZT23 | 0.0025 | | |
| | ZT16 vs ZT20 | 0.0003 | Leaf sheath reducing sugars | ZT1 vs ZT19 | 0.0043 | |
| | ZT20 vs ZT23 | 0.0101 | | ZT1 vs ZT23 | 0.0416 | |
| | | ZT4 vs ZT19 | | 0.0035 | | |

Additional file 2: Table S9. Sugars quantification data from sugarcane leaves and culms in mg/g*. Data shown stands for untreated samples only.

| Sugar (mg/g) | | Organ | Additional information | Reference |
|--------------|-------------------|---|---|---------------------------|
| Sucrose | Reducing sugars** | | | |
| 11.70 | 6.10 | Leaf | Young leaves; mg/g FW*** | Batta and Singh, 1986 |
| 28.70 | 19.10 | | 3-month-old****; mg/g FW | Batta et al., 1995 |
| 10.27 | 1.35 | | 4-month-old; 27°C; mg/g FW | Ebrahim et al., 1998 |
| 6.20 | 4.00 | | 3-month-old; mg/g FW | Sachdeva et al., 2003 |
| 13.69 | 2.79 | | +3 leaf; 9-12-month-old; field; mg/g FW | McCormick et al., 2006 |
| 14.02 | 0.09 | | 3-month-old; mg/g FW | Mattiello et al., 2015 |
| 33.40 | 5.9 | | 9-month-old; +1 leaf; field | Ferreira et al., 2016 |
| 50.00 | 110.00 | | +2 leaf; 32 days old; | Cunha et al., 2017 |
| 29.20 | 50.40 | | Culm | Young; mid culm |
| 134.00 | 26.00 | 6-month-old; mid culm; mg/g FW | | Batta et al., 1995 |
| 102.69 | <i>n/a</i> | 9-month-old; range from 8.6 - 102.7 | | Zhu et al., 1997 |
| 85.75 | 10.81 | 4-month-old; mid culm; 27°C; mg/g FW | | Ebrahim et al., 1998 |
| 400.00 | <i>n/a</i> | adult; field; mid culm | | Botha and Black, 2000 |
| 25.00 | 22.00 | 3-month-old; mid culm; mg/g FW | | Sachdeva et al., 2003 |
| 17.11 | 20.71 | 9-12-month-old; internode 6; field; mg/g FW | | McCormick et al., 2006 |
| 177.99 | 14.41 | 16-month-old; internode 7 | | Wu and Birch, 2007 |
| 150.00 | 20.00 | 7.5-month-old; upper culm; mg/g FW | | Batta et al., 2008 |
| 38.00 | <i>n/a</i> | 10-month-old; young internodes; hot chamber | | Imman-Bamber et al., 2010 |
| 34.50 | 147.9 | 9-month-old; mid internodes; field | | Ferreira et al., 2016 |
| 190.00 | 210.00 | 32 days old; upper culm | Cunha et al., 2017 | |

*data presented in $\mu\text{mol/g}$ was converted to mg/g.

**data presented as glucose and fructose in the literature are shown as reducing sugars in a joined column

***FW stands for fresh weight.

****at this stage culms are leaf sheath but already accumulate sucrose.