

3.6 Leaf total chlorophyll content

Table 5 illustrates the impact of water regimes on leaf chlorophyll content (μm) in *Solanum lycopersicum* genotypes Hortitom 1 and Hortitom 3. Hortitom 1 exhibited total chlorophyll ranging from 36.46 μm under T4 (watering every three days) to a peak of 66.92 μm under T6 (every five days), with high values also at T5 (64.53 μm), indicating optimal retention under moderate water stress. In contrast, Hortitom 3 displayed substantially higher total chlorophyll peaks at 82.00 μm (T3, every two days) and 84.61 μm (T4, every three days), far exceeding other treatments, driven by elevated chlorophyll a in these regimes while chlorophyll b remained lower but slightly increased. Overall, Hortitom 3 outperformed Hortitom 1 in maximum chlorophyll accumulation, particularly under frequent watering, suggesting better photosynthetic adaptation to specific regimes.

Table 5 Effect of watering regime on the leaf chlorophyll content (mg/g fresh weight) of two genotypes of *Solanum lycopersicum*

| Tomato genotype | Chlorophyll content (mg/g fresh weight) | Watering regime | | | | | | | |
|-----------------|---|-----------------|-------|-------|-------|-------|-------|-------|----|
| | | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 |
| Hortitom 1 | a | 22.83 | 28.10 | 19.16 | 16.79 | 29.27 | 29.84 | 23.36 | - |
| | b | 23.98 | 27.36 | 20.07 | 19.67 | 35.26 | 37.08 | 23.04 | - |
| | Total | 46.82 | 55.46 | 39.23 | 36.46 | 64.53 | 66.92 | 46.39 | - |
| Hortitom 3 | a | 22.15 | 22.00 | 68.21 | 67.86 | 21.19 | 28.33 | 26.31 | - |
| | b | 22.76 | 21.80 | 13.79 | 16.75 | 22.32 | 29.82 | 25.15 | - |
| | Total | 44.91 | 43.81 | 82.00 | 84.61 | 43.51 | 58.15 | 51.45 | - |

Note: Each value is a mean of 5 replicates. T1: watering twice daily; T2: watering once daily; T3: watering every two days; T4: watering every three days; T5: watering every four days; T6: watering every five days; T7: watering every six days; T8: continuous waterlogging; H1: Hortitom 1 genotype; H3: Hortitom 3 genotype

4 Discussion

Tomato genotypes Hortitom 1 (H1) and Hortitom 3 (H3) demonstrated distinct physiological adaptations to water stress regimes, from optimal twice daily watering (T1) to severe restriction every six days (T7), with complete mortality under waterlogging (T8) due to root hypoxia (Sharma and Pathak, 2020).

4.1 Effect on growth parameters

Water stress regimes showed genotypic differences in vegetative growth. In Hortitom 1, plant height peaked under moderate stress (T5), reflecting adaptive enhancements typical of mild drought responses that optimize resource allocation (Alomari-Mheidat et al., 2024; Mustapha et al., 2025). Conversely, Sillo (2022) noted generally reduced height and stem diameter under deficits, underscoring genotype dependency, while Hortitom 3 consistently displayed taller plants, indicative of superior water use efficiency (Tüzel et al., 2025). Leaf number progressed upward in Hortitom 1 from T1 to T7, enabling sustained production amid restriction, aligning with leaf area adjustments for stress acclimation (Koch et al., 2019). Hortitom 3, however, exhibited declines at intermediate intervals, potentially signaling adaptive senescence to conserve water (Petrović et al., 2021). Leaf area fluctuated markedly in Hortitom 1 but remained stable in Hortitom 3, suggesting the latter's conservative strategy for optimized transpiration (Razouk et al., 2022; Chiofalo et al., 2025). Stem girth showed remarkable stability across treatments in both, a trait likely genetically governed to preserve vascular function under fluctuating moisture (Rodriguez et al., 2021; Amankwaa-Yeboah et al., 2023). Reproductive timing was also disturbed, with both genotypes experiencing progressively delayed first flowering under rarer watering, attributable to curtailed carbon fixation and hormonal shifts (Fernández-García et al., 2021; Sillo et al., 2022).

4.2 Effect on biomass accumulation

Hortitom 1 preserved stable fresh and dry leaf weights across regimes, minimizing photosynthetic losses, while root numbers surged under moderate drought to exploit deeper soil water, though stem biomass decline progressively, showing resource shifts from structure to acquisition (Arif et al., 2022; Kou et al., 2022). In Hortitom 3, fresh leaf weights increased with decreasing irrigation frequency, implying leaf carbon gain (Flexas et al., 2020); root fresh and dry weights similarly amplified. Stem biomass declined steadily in both genotypes, a conserved response to curtail non essential growth (Tüzel et al., 2025).