

#### 4.3 Effect on yield components

Yield responses revealed adaptive strategies under water stress. Hortitom 1 kept fruit numbers fairly steady, with slight drops in fresh weight but clear gains in fruit length and width during water shortages, directing more resources to individual fruits for bigger sizes (Poomkokrak et al., 2024; Zahedifar et al., 2025). In comparison, Hortitom 3 had greater changes in fruit count and size, boosting fresh and dry weights with less frequent watering while fruit length and width decreased, matching patterns of stress-induced fruit drop and limited growth (Medyouni et al., 2021; Zhang et al., 2025).

#### 4.4 Effect on fruit nutritional and proximate compositions

Irrigation frequency greatly affects the quality of tomato fruits. In Hortitom 1, watering every 2-5 days raised moisture, crude fiber, and protein levels by concentrating these nutrients with less water dilution (Hasanuzzaman et al., 2021; Wadood et al., 2024). Hortitom 3 showed similar changes, with varying levels of moisture, fat, ash, fiber, and protein that improved under the same moderate stress. Minerals and heavy metals also shifted: Hortitom 1 built up more calcium during moderate stress to help it adapt, while potassium was highest with frequent watering to support water balance and leaf pore control (White and Broadley, 2020). Factors like genotype root links and soil microbe effects further shaped these trends (Ojewumi et al., 2025; Tripodi et al., 2025).

#### 4.5 Effect on total chlorophyll content

Chlorophyll levels, which show how well plants photosynthesize, improved best under mild water limits. Hortitom 1 built up higher total chlorophyll, chlorophyll a, and chlorophyll b with watering every few days, helping it capture light more effectively (Flexas et al., 2021; Akhlaq et al., 2025; Atanassova et al., 2025). Hortitom 3 reached even higher peaks under certain moderate watering schedules, pointing to strong photosystem activity and built-in toughness for its type, even though drought often slows photosynthesis overall (Argentele-Martínez et al., 2024; Karami et al., 2025).

### 5 Conclusion and Recommendations

In conclusion, the two tomato genotypes exhibited distinct responses to different watering regimes, highlighting the importance of genotype-specific irrigation management. Hortitom 1 performed optimally under moderate water stress (watering every 4 days, T5), where it achieved maximum plant height and the highest crude protein content. Hortitom 3, on the other hand, showed superior fruit yield under more severe water restriction (watering every 6 days, T7). Both genotypes attained their highest plant height at T5, demonstrating good tolerance to moderate drought conditions.

The study further revealed that continuous waterlogging (T8) caused complete mortality in both genotypes, indicating high susceptibility to excess water. However, both Hortitom 1 and Hortitom 3 displayed strong drought tolerance, maintaining 100% survival even under watering intervals of up to six days.

These findings suggest that adopting genotype-specific watering regimes can significantly improve water productivity and fruit quality in resource-limited environments. For optimal performance, Hortitom 1 should be irrigated every 4 days, while Hortitom 3 performs better with irrigation every 6 days under greenhouse conditions. Both varieties should be grown only on well-drained soils to avoid waterlogging.

Future studies should validate these results under field conditions across different seasons and soil types to enhance the applicability of the recommendations for smallholder farmers.

#### Author's contribution

Otitoloju Kekere designed and supervised the research, and prepared draft of the manuscript. Hepzibah Tofunmi Oyetunde set up the experiment and collected data. Hepzibah Tofunmi Oyetunde and Joseph Kolade Afolabi co-designed and monitored the experimental process. Joseph Kolade Afolabi performed statistical analyses of the data. All authors read and approved the final manuscript.

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