

temperatures ($<10^{\circ}\text{C}$) impair pollination. Farmers mitigate these using greenhouses or shade nets (Sharma et al., 2020). Adequate light is essential for photosynthesis and fruit ripening, with supplementation needed in low-light regions.

Water stress during critical growth stages reduces yields and triggers disorders like blossom-end rot. Effective countermeasures include drip irrigation (40%-60% efficiency gains), deficit irrigation, and mulching to control evaporation, regulate soil temperature, and suppress weeds (Feres and Soriano, 2020; Makhadmeh et al., 2022; Ayana and Olika, 2024). Water is central to tomato physiology, driving cell expansion, nutrient uptake, and fruit development. Drought-induced deficits limit biomass, fruit set, and nutrient profiles, while excesses cause other issues (Bastías et al., 2020; Nguyen et al., 2021; Burato et al., 2024). Genotypic variations, such as deeper roots or osmotic adjustments, enhance tolerance (Alam et al., 2021). However, limited data exist on how irrigation regimes affect growth, yield, and fruit nutritional quality in newly developed Nigerian tomato genotypes, Hortitom 1 and Hortitom 3, under screen house conditions.

In the face of water scarcity and climate variability, tomatoes require precise irrigation to sustain yields and quality (Ray and Majumder, 2024). Evaluating watering regimes for Hortitom 1 and Hortitom 3 through different irrigation methods can improve water use efficiency, root nutrient uptake, and loss reduction while maintaining nutritional content (Gheysari et al., 2021). Such insights can guide farmers toward optimal practices, enhance nutritional output for consumers, and inform breeders about genotype-environment interactions for resilient varieties (Santos et al., 2021). Therefore, this study aims to assess the impact of varying watering levels on growth, yield parameters, and fruit nutritional composition of Hortitom 1 and Hortitom 3 under screen house conditions.

2 Materials and Methods

2.1 Location of the experiment

This experiment was carried out at the screen house of the Department of Plant Science and Biotechnology, Adekunle Ajasin University, Akungba-Akoko, Nigeria (latitude 7.2°N , longitude 5.44°E).

2.2 Sources of materials for the experiment

Two tomato (*Solanum lycopersicum* L.) genotypes, Hortitom 1 and Hortitom 3, were obtained from the National Horticultural Research Institute (NIHORT), Ibadan, Oyo State, Nigeria. The soil was analyzed for physical and chemical properties using the standard methods of AOAC (1985). It was shade-dried and passed through a 2-mm sieve before analysis.

2.3 Soil collection and preparation

Topsoil (0-15 cm depth) was collected from an arable farmland within the premises of Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. The soil was sieved to remove debris and thoroughly mixed to obtain a homogeneous medium. Approximately 14 kg of prepared soil was filled into each perforated polythene pot. Tomato seedlings raised in the nursery for 3 weeks were transplanted into perforated polythene pots filled with 14 kg of topsoil; only pots for waterlogged conditions were not perforated.

2.4 Experimental setup

The potted plants were watered regularly for two weeks after transplanting for proper seedling establishment. Thereafter, they were differentially exposed to eight watering regimes: watering twice daily (T1), once daily (T2), every 2 days (T3), every 3 days (T4), every 4 days (T5), every 5 days (T6), every 6 days (T7) and completely waterlogged (T8). Pots were laid out on the screen house floor in a completely randomized design (CRD) with each treatment replicated five times. It was a 2×8 factorial experiment with genotype as Factor A at 2 levels, and watering regime as Factor B at 8 levels. Except waterlogging condition that was permanently flooded, each potted plant received approximately 380 ml of water at every watering time. This was the volume required to keep the soil at field capacity based on 36% field capacity of the soil. Standard agronomic practices including weeding and pest control were carried out during the experiment.