

multispectral data, and Internet of Things sensors can be used to evaluate tree water status and guide precise irrigation. Machine learning models can integrate meteorological, soil, tree, and remote sensing data to predict water demand, nutrient status, and changes in yield and fruit quality, thereby providing decision support for orchard management. Future research should strengthen the integration of sensor data, water-fertilizer management records, and nutrient diagnosis models, and develop peach-specific management tools suitable for different production regions, tree ages, and soil types.

From the perspective of production application, efficient peach cultivation should take integrated drip irrigation and fertilization as the core, combined with regulated deficit irrigation, soil mulching, microclimate regulation, and precise fertilization. The key is not to apply more water and fertilizer, but to ensure that water and nutrients are absorbed and utilized by trees at the appropriate time, location, and ratio. Future studies should also pay attention to soil salinity accumulation, microbial changes, nutrient residues, and environmental impacts under long-term application. A water and fertilizer integrated management system that balances high yield, high quality, water saving, fertilizer saving, and ecological safety should be gradually established, so as to promote the peach industry toward green and sustainable development.

Acknowledgments

The authors would like to express their sincere gratitude to Mr. Li for his assistance in organizing the literature materials. The authors also extend special thanks to the two anonymous peer reviewers for their comprehensive evaluation of the manuscript.

Conflict of Interest Disclosure

The authors affirm that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

Reference

- Abidi W., Akrimi R., Hajlaoui H., Rejeb H., and Gogorcena Y., 2023, Foliar fertilization of potassium silicon improved postharvest fruit quality of peach and nectarine [*Prunus persica* (L.) Batsch] cultivars, *Agriculture*, 13(1): 195.
<https://doi.org/10.3390/agriculture13010195>
- AboOgiela H.M.A., 2021, The effect of water shortage at different stages of fruit growth on the yield and fruit quality in, *Menoufia Journal of Plant Production*, 6(8): 389-403.
<https://doi.org/10.21608/mjppf.2021.193752>
- Abrisqueta J.M., Mounzer O., Álvarez S., Conejero W., García-Orellana Y., Tapia L.M., Vera J., Abrisqueta I., and Ruiz-Sánchez M., 2008, Root dynamics of peach trees submitted to partial rootzone drying and continuous deficit irrigation, *Agricultural Water Management*, 95(8): 959-967.
<https://doi.org/10.1016/j.agwat.2008.03.003>
- Ali M.A., Abd-Elmageed N.A., Abd-El Hady R.M., and Osman A., 2019a, Growth, yield, fruit quality and elemental composition as affected by some macronutrients fertilization of 'Florida Prince' peach cultivar, *Journal of the Advances in Agricultural Researches*, 24(3): 326-341.
<https://doi.org/10.21608/jalexu.2019.163450>
- Ali M.A., Ezz T.M., Abd El-Megeed N., and Felfil M., 2019b, Effect of foliar application with some micronutrients on 'Florida Prince' cultivar peach tree, *Journal of the Advances in Agricultural Researches*, 24(3): 410-425.
<https://doi.org/10.21608/jalexu.2019.163473>
- Ali N., Dong Y., and Lavelly E., 2024, Impact of irrigation scheduling on yield and water use efficiency of apples, peaches, and sweet cherries: A global meta-analysis, *Agricultural Water Management*, 306: 109148.
<https://doi.org/10.1016/j.agwat.2024.109148>
- Andrade D., Covarrubias M.P., Benedetto G., Pereira E.G., and Almeida A.M., 2019, Differential source-sink manipulation affects leaf carbohydrate and photosynthesis of early- and late-harvest nectarine varieties, *Theoretical and Experimental Plant Physiology*, 31(2): 341-356.
<https://doi.org/10.1007/s40626-019-00150-0>
- Anthony B.M., and Minas I.S., 2021, Optimizing peach tree canopy architecture for efficient light use, increased productivity and improved fruit quality, *Agronomy*, 11(10): 1961.
<https://doi.org/10.3390/agronomy11101961>
- Bai Q., Shen Y., and Huang Y., 2021, Advances in mineral nutrition transport and signal transduction in Rosaceae fruit quality and postharvest storage, *Frontiers in Plant Science*, 12: 620018.
<https://doi.org/10.3389/fpls.2021.620018>
- Bianco R.L., and Rieger M., 2002, Roles of sorbitol and sucrose in growth and respiration of 'Encore' peaches at the three developmental stages, *Journal of the American Society for Horticultural Science*, 127(2): 297-302.
<https://doi.org/10.21273/jashs.127.2.297>