

ID: 610

## Sustainable Irrigation Strategies for Enhancing Hass Avocado Yield in Arid Region of Tacna, Peru

Francisco Condori Tintaya<sup>1\*</sup>, Tefide Kızıldeniz<sup>2</sup>, Oscar Fernandez Cutire<sup>1</sup>, Junior Miranda Gutierrez<sup>1</sup>, Yhudit Marili Mamani Llaca<sup>1</sup>

<sup>1</sup> Facultad de Ciencias Agropecuarias, Universidad Nacional Jorge Basadre G., Tacna, Peru

<sup>2</sup> Biosystem Engineering Department, Faculty of Agricultural Sciences and Technologies, Nigde Omer Halisdemir University, Niğde, Türkiye

### Abstract

Hass avocado production in the Tacna region of Peru faces challenges related to irrigation efficiency and water availability. Efficient water management is essential for improving tree growth, fruit yield, and economic sustainability. This study aims to evaluate the relationship between irrigation efficiency, soil moisture levels, and avocado productivity to identify key factors influencing sustainable production. A comparative analysis approach was used to assess soil moisture, irrigation efficiency, tree growth, and fruit yield across different regions. Data were collected through field measurements, including soil moisture at various depths, irrigation system performance, and tree development indicators such as height and stem diameter. Regions with higher irrigation efficiency demonstrated better tree growth and higher fruit yields. The tallest trees and widest stem diameters were observed in areas with optimal water management, while inefficient irrigation systems led to lower productivity. Economic analysis indicated that high irrigation costs in water-scarce regions posed financial challenges, but improved irrigation techniques enhanced profitability. Climate change and water scarcity were identified as major risks, emphasizing the need for precision irrigation and sustainable water management practices. Optimized irrigation and soil moisture management significantly improve avocado production. To ensure long-term sustainability, modern irrigation systems and efficient water use strategies should be prioritized in water-scarce regions.

**Key words:** Hass avocado, irrigation efficiency, soil moisture, fruit yield, water management, sustainable agriculture, precision irrigation.

