

# Climate Change Impacts Mitigation Using Protective Nets and IoT Technologies in Mountainous Mediterranean Cherry Orchards: Cyprus as a Case Study - Abstract

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## Summary

The agri-food sector in Cyprus has high potential in the production of fresh fruits and nuts, which are cultivated, due to climatic requirements, in the mountainous and semi-mountainous areas of Troodos, covering the central part of the island. Restrictive social, economic and environmental factors are leading to a steady decline in agricultural production in these areas leaving this potential untapped. The aging of the rural population, depopulation, increased production costs due to high dependency on external inputs (e.g., agrochemicals, fuels) and highly fragmented farms, along with adverse climatic conditions that prevail in recent years, cause uncertainty in fruit production.

The growing negative effects of climate change on the agricultural sector are undermining significantly both yield and fruit quality and thus require the development and use of techniques and tools capable of mitigating these effects. Among other practices, the use of protective nets is one of the most effective and environmentally friendly methods, which is argued that interacts positively with climatic factors and thus affects yield (i.e., prevents production losses) and fruit quality.

The purpose of this study is to evaluate the effects of protective nets (anti-hail and anti-rain nets) on a sweet cherry orchard in terms of microclimate components and related tree canopy traits. To this end, Internet of Things (IoT) technologies (e.g., smart sensors) and hand-held instruments have been deployed in an orchard for sensing aerial environment (solar radiation, air temperature, relative humidity and wind speed), soil factors (soil temperature, moisture, electrical conductivity), and canopy traits (leaf temperature and stomatal conductance). Microclimate data and canopy traits from a covered and a non-covered, by protective nets, area of the orchard were collected, stored, and analyzed aiming at identifying the impact of protective nets on orchard microclimate and canopy traits, and evaluate the use of IoT technologies as a decision support system for farmers and agronomists.

The first results showed that protective nets significantly shaped orchard microclimate, mainly through the reduction of incident solar radiation and the change in light distribution within orchard canopy. The change in orchard microclimate due to the protective nets resulted in reduced reference evapotranspiration and leaf temperature on the top of the canopy. Overall, this study provides evidence that the use of IoT technologies in semi-controlled environments, such as orchards with protective nets, is necessary for sensing the local microenvironment and provide decision support to farmers and agronomists.

## Keywords

Internet of Things, smart sensors, agriculture, mountainous areas, orchards

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