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Innovative Agricultural Practices to Increase Farm Sustainability - Tomato Production of Low Nitrogen Footprint

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Abstract

Nitrogen (N) is a key indispensable nutrient for all living organisms including humans. For over one century, synthetic fertilizers and agriculture intensification allowed to feed the world population, but this came with high environmental costs. N is the element with the most altered cycle and constitutes the most pressing environmental issue faced today, making it the most important emerging environmental concern. Nitrogen use efficiency is the solution to improve soil, water and air quality while avoiding increased costs to the farmers. Tomato is one of the most consumed crops worldwide and requires high amounts of N inputs to achieve high yields. The need for new agricultural practices to reduce N inputs and promote N losses mitigation urges. One field experiment were set up to increase N use efficiency and decrease tomato production N footprint. Two different treatments were applied, with and without *Mycorrizae*. Conventional fertilization practice in the farm served as control and three other doses of N inputs were tested in both treatments, on the same tomato variety. *Mycorrhizae* are symbiotic associations between plan roots and soil fungi, able to increase crop growth through the improvement of plant's nutritional status. A mycorrhization protocol was designed and validated for tomato plants. Several samples of soil, plants and fruits were collected for chemical analysis and N monitoring along the growing cycle. At harvest, tomatoes from each treatment were collected, quantified and weighted to determine productivity. Fruit samples were analysed for quality validation. Crop production yield and fruit quality found significant differences between treatments. *Mycorrhizae* promote the growth of tomato plants increasing the N uptake, regardless the N dose applied to the soil. This innovative agriculture practice presents an alternative for the use of higher doses of mineral N fertilizer inputs and reduces the nitrogen footprint of tomatoes' production.

Keywords: crop production, fertilization, Mycorrizae, nitrogen footprint, tomato

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