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Decision support system software to calculate irrigation and nutrient requirements in greenhouse tomato

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ABSTRACT

Even though farms have technical capacity to frequently apply nutrients and irrigation according to crop demand, potassium (K) and nitrogen (N) supply and the hydric welfare index were the most important limiting factors responsible of greenhouse tomato yield variability in Uruguay. To assist farmers and advisers in daily calculation of irrigation and nutrient concentration tailored to the specific characteristics of each crop and greenhouse this work presents a tomato fertigation decision support system (DSS) app (free use) based on VegSyst-DSS. The DSS calculates daily N, phosphorous (P), K, calcium (Ca), magnesium (Mg) fertilizer and irrigation requirements, and the nutrient concentration in solutions applied by fertigation. The DSS is based on VegSyst simulation model calibrated and validated for spring and autumn tomato crop in Uruguay for evapotranspiration (ET_c), N and K uptake. The original VegSyst model was used for P, Ca and Mg uptake. Irrigation is calculated from estimatives of crop ET_c made with the VegSyst model and irrigation system configuration. N, P, K, Ca and Mg fertilizer requirements are calculated daily considering the uptake of nutrients simulated with the VegSyst model and soil and water sources. The DSS also considers nutrient supply from manures, green manures and incorporation of previous crop. The software has been designed to be participative and intuitive for practical use by farmers and agronomical advisors. The DSS will contribute to improve crop yield, water and nutrient use efficiency and reduce environmental burden.

KEYWORDS: *Solanum lycopersicum*, fertilization, nutrient uptake, evapotranspiration, modeling.

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