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Development of criteria to improve water use efficiency in tomato crop (*Solanum lycopersicum* L.) under greenhouse in Ecuador

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Tomato (*Solanum lycopersicum* L.), grown under greenhouse in Ecuador, has a major weight in the farmers' income in regions with water scarcity. In the one hand, these areas show small water use efficiency caused by the non-technical criteria in the design of drip irrigation systems. On the other hand, farmers are unknown of the tomato water requirements, and do not know how to determine them. Moreover, they do not know how much water apply and the irrigation frequency depends on the availability of farmers' time. In addition, in most cases greenhouses are lacked of equipment to measure climatic conditions.

This study evaluates different irrigation strategies, and its efficiency in the use of water, in the cultivation of tomatoes under greenhouse. It considers also they effect on the production and organoleptic quality of the fruit (size, dry matter and number of fruits). The methodology, first estimates the tomato water needs which was developed through the measures taking with practical and affordable equipment for farmers in the area. Then, the optimal water depth for irrigation was estimated on a daily basis application. Likewise, two factors were evaluated: number of irrigations per day (one or two) and water depth (80%, 100%, 120% of crop evapotranspiration, and the one applied by local farmers). Thus, the combination of the two factors resulted in eight irrigation strategies which were implemented in irrigation plots following a randomized block design with four repetitions. The evaluation was accomplished in the four crop harvest over one year. The results helped to develop sustainable irrigation criteria for tomato crop under greenhouse in the area. These have improved water use efficiency, and maintained the production and quality of the fruits, which will be beneficial not only for the farmers' income but also in agriculture's resilience .