Water and Energy Use Efficiency of Greenhouse and Net house Under Desert Conditions of UAE: Agronomic and Economic Analysis

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Abstract The GCC (Gulf Cooperation Council) countries are considered one of the most water scarce region in the world, and facing over the coming years the most severe intensification of water scarcity in history. Protected agriculture area in the GCC countries is close to 13,000 ha and most of it are using Pad-fan cooling system which lead to high energy and water consumption. This research aims to assess the water and energy use efficiency between a high technology greenhouse equipped by pad-fan and sun screen system and a low technology net house equipped by a mist system. Three crops were cultivated, cherry tomato and sweet pepper under greenhouse and cucumber under net house. Greenhouse presented the highest water consumption used for cooling process. In fact, cooling consumes 2.6 and 3.5 times more water than the required irrigation water for sweet pepper and cherry tomato respectively. However, the fogging system in the net house was consuming less water, about 75% of consumed irrigation water used for cucumber. Data related to energy use were tremendously high where greenhouse consumed 32 times the energy used under net house. This study showed also that cooling cost in the total production cost is much higher and heavier under greenhouse resulting in high production cost and loss of competitiveness of the local product in the market where imported products seems to be more competitive than local produced products. Therefore, there is a need to improve energy and water use efficiency in the protected agriculture in GCC region and to reduce the water and energy footprint under protected agriculture in GCC region.

Keywords Yield · Cucumber · Cherry tomato · GCC region · Net house

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