Does Temperature Affect the Dissolved Oxygen Concentration Within Hydroponic Solutions?

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Hydroponics, in which the plant environment is controlled and managed, has been found to be effective in increasing food production. This is extremely important to meet the needs of future populations. This can be achieved with an efficient and effective nutrient solution to supply the plant roots with water and essential mineral elements in a soluble form and also provides an adequate concentration of dissolved oxygen for root cellular respiration. This experiment determined if a water ionizer delivers significantly greater D.O. into a plant nutrient solution than natural diffusion or with the use of an air bubbler at temperatures of 15° C, 20° C, and 25° C. A hypothesis was formed that stated the nutrient solutions, in which the electronic Ionizer was used for 20 minutes, would contain and retain more dissolved oxygen than those solutions treated with diffusion or air bubbling for the same amount of time even as temperature increased. The data supported the hypothesis. Ionization of water produced the greatest concentration of dissolved oxygen in plant nutrient solution at 15° C, followed by the bubbling system and the lowest for the natural diffusion method at all temperatures tested. Furthermore, the data from this experiment indicates that applying the ionization to a plant nutrient solution at 15°C would significantly allow for the highest amount of dissolved oxygen retention for the most extended amount of time with 25° C significantly retaining the least.

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