Dissolved Oxygen Augmentation Effects on the Hydroponic Cultivation of Eruca sativa in a NFT System

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Chlorosis is a common problem in the commercial growth of arugula in Nutrient Film Technique (NFT) systems and can be caused by nutrient or oxygen deficiencies. Building on conclusions from previous years, this project seeks to determine the impact of DO on chlorophyll levels, crop yield, and metabolic activity. Group A was grown with DO concentration between 9-13mg/L. Group B was grown without added DO. Forty rockwool plugs with seedlings were used in each group, distributed in 4 growth channels of the hydroponic A-frame. Temperature, pH, DO, EC and chlorophyll were measured regularly throughout both trials to maintain the nutrient concentration and oxygen levels. At the end of experimentation, the mass of fresh foliage and dried roots were measured. At the end of Trial 2, neutral red, an ATP-dependent active transport stain, was used to evaluate the metabolic activity of the roots through microscopy and colorimetry. Plants in Group A grew more foliage, had a greater mass of roots and longer roots, higher chlorophyll levels, less chlorosis, and greater metabolic activity in the roots. Root length, chlorophyll levels and the metabolic activity evidenced by colorimetry were statistically significant. The growth of secondary roots and increased metabolic activity in the roots allowed plants to absorb more nutrients, preventing chlorosis and explaining the higher chlorophyll levels in Group A. Augmentation of DO in commercial hydroponic systems should result in reduced plant stress and susceptibility to pathogens, increased crop yield, overall profit for growers, and an increase in food supply for the community.

Awards Won:
Fourth Award of $500