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Investigation of the Effects of Growth Environment on the Ferric Reducing Antioxidant Power of Selected Plant Species

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Metabolism within the human body creates multiple oxidant by-products. These oxidants may cause cell injury, damage to DNA, and many other bodily defects leading to chronic diseases. Antioxidants are important dietary components which defend against oxidative damage by scavenging the oxidant by-products. Research has shown that diets rich in antioxidants offer protection against various chronic diseases.

The goal of this research is to determine the effects of different growing conditions on the production of antioxidants in plants, and to ultimately find the best possible growth environment for a plant to produce the maximum amount of antioxidants. Each plant was grown in different environmental conditions including a positive, negative and control treatment. The positive treatment consisted of water to field capacity with fertilizer, the negative treatment consisted of half of the water given to the field capacity treatment with no fertilizer and the control treatment consisted of water to field capacity with no fertilizer. The ferric reducing antioxidant power evaluates antioxidant potential by reducing ferric iron (Fe^{3+}) to its ferrous form (Fe^{2+}). Addition of excess ferric ions result in the development of a Prussian blue color. The ferric reducing antioxidant power of the extracts is measured by reading the absorbance at 750 nm using a spectrophotometer.

The ferric reducing antioxidant power assay was performed on extracts of red clover (*Trifolium pratense*), Amur honeysuckle (*Lonicera maackii*) and wild garlic (*Allium vineale)*. The differing growth conditions resulted in variation in the production of antioxidants by the plants. The data obtained revealed that the negative growing conditions produced a significantly low level of antioxidants when compared to the positive environmental treatment. These results indicate that environmental growth conditions can influence antioxidant production in plants.