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Biofortification of Iron in Hydroponically Grown *Ipomoea aquatica, Lactuca sativa,* and *Alternanthera sessilis* as a Solution to Alleviate Iron Deficiency in Sri Lanka

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Diets high in calories but lacking in essential vitamins and minerals cause micronutrient deficiencies. Iron deficiency is the most common micronutrient deficiency worldwide, mostly affecting developing countries like Sri Lanka. This study aimed to analyse the possibility of increasing the nutritional Fe content of hydroponically grown *Ipomoea aquatica* (Kankun: KK), *Lactuca sativa* (Lollo bionda lettuce: LT), and *Alternanthera sessilis* (Mukunuwenna: MK) as a solution to reduce iron deficiency in Sri Lanka. Six 3-week-old KK, LT and MK plants grown in coconut coir pellets were transferred into a hydroponics system containing AiGrow Private Limited formulated nutrient solution (NS) with added Fe supplementation salts (7.0 ppm and 10.5 ppm). The control group was treated with only the NS which had a Fe concentration of 3.5 ppm. The plants were harvested after 4 weeks of treatment to determine the total Fe concentration using atomic absorption spectroscopy. The effect of Fe concentrations on nutritional and antioxidant parameters was also tested. Compared to controls, LT and MK had the highest Fe concentration in the 10.5 ppm Fe condition, while KK had the highest Fe concentration in the 7.5 ppm Fe condition. The total carbohydrate and protein contents increased with Fe levels. MK recorded the highest total carbohydrate content (22.78 g/100 g in 10.5 ppm) and LT recorded the highest protein content (4.64 g/100 g in 10.5 ppm). MK grown in 3.5 ppm Fe content showed the highest antioxidant activity (71% of DPPH inhibition). Overall, it can be suggested that this method is a viable approach for Fe biofortification in plants. Additional research is necessary to determine the relationship between biochemical patterns and enhanced Fe content in the plants.

Keywords: *biofortification, antioxidants, hydroponics, Ipomoea aquatica, Lactuca sativa, Alternanthera sessilis*