Exploring the possibility of reducing nitrate content of baby-leaf lettuce through flushing the nitrate solution 24 hours prior to harvest compared to limiting the nitrate concentration throughout the cultivation period in a vertical farm

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Vertical farming, is a relatively new technology that utilizes soilless culture methods to cultivate vegetables on multiple horizontal layers using artificial lighting. Leafy vegetables can accumulate high levels of nitrates which are linked to gastric cancer. In an effort to produce safe-for-consumption leafy greens, several cultivation techniques can be implemented. The aim of this research was to reduce nitrate levels in "baby-leaf", butterhead lettuce in vertical farming conditions while maintaining high productivity. This goal was primarily achieved through the manipulation of the nutrient solution (NS). The control solution had a nitrogen content of 12 mmol/l (12N), whereas the solution with the reduced content, had a nitrogen level of 4 mmol/l (4N). The possibility of replacing the NS of the 12N treatment with tap eater for 24 hours before harvest (TW24) was also investigated. During the experiment, Butterhead lettuce plants (cv. Cecilia RZ) were grown at a density of 1600 plants/m^2 on rockwool plug-sheets until the first 6-8 true leaves. The light intensity was 400 umols m^{-2} s^{-1}, and the photoperiod was 12 hours long. The leaf number (LN), leaf area (LA), the fresh weight (FW), and the dry weight (DW) of the leaves were measured during harvest. Subsequently, the dried leaves were used for chemical analysis for the determination of the leaf nitrate content. The results indicated that all agronomic characteristics were compromised with the reduction of nitrogen from 12N to 4N. The nitrate levels were the highest under 12N, followed by the 12N-TW24, and lowest under 4N conditions.