Vertical Farming: An Approach to Sustainable Agriculture and Food Security for the Future: Cultivation, Yield and Product Quality

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Purpose: Over the last century, the global population has quadrupled. To combat future food demand, farmers worldwide will need to increase crop production, either by increasing the amount of agricultural land to grow crops which causes deforestation and climatic imbalances or by enhancing productivity on existing agricultural lands through precision farming. In the last few decades, excessive use of fertilizers and modified seeds have done a lot of damage to water, soil and traditional farming system. Therefore, to multiply food production on a limited space along with optimized use of water and fertilizer, ‘vertical farming using hydroponics’ is a useful alternative. Aim of this study was, (1) to grow leafy and fruit vegetables in vertical towers, (2) to compare the yield of products raised in vertical towers with that grown in the field. and (3) to test the quality of products of vertical farm and compare them with field grown crops. Procedure: A comparison of the product yield, total phenolics, total flavonoids, and antioxidant properties was done in different leafy vegetables/herbs (basil, chard, parsley, and red kale) and fruit crops (bell pepper, tomatoes, cucumber, and squash) grown in vertical towers and in the soil. Results: Plants grown in vertical hydroponic towers have exhibited higher biomass yield, higher antioxidant and, higher phenolic and flavonoids content as compared to those grown in the soil. Conclusions: Based on these results it can be concluded that vertical farming can be a suitable option to grow vegetable crops to achieve higher yield and quality of the product in a limited farming space to combat future food needs for increasing human population.

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