Effects of Organic and Inorganic Fertilizers on Yield and Nutrient Composition of Leafy Vegetables in Soilless Potting Mixes

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Abstract:

This study investigated the comparative effects of organic and inorganic fertilizers on the nutrient profile of four leafy vegetables: Amaranth (*Amaranthus viridis*), Cowpea (*Vigna unguiculata*), Spinach (*Spinacia oleracea*), and collard (*Brassica oleracea*). A split-plot design with four replications was used in a controlled greenhouse environment at the Department of Horticulture, Bukalasa Agricultural College, from January to September 2024.The soilless potting growth media consisted of varying ratios of charcoal dust (CD) and coffee husk (CH): 2:1, 1:1, and 1:2. Two fertilizer types – an organic fertilizer derived from dried *Tithonia diversifolia* leaves, and an inorganic NPK fertilizer – were applied to assess their effects on yield and nutrient composition of the selected vegetables. Statistical analysis revealed that fertilizer type had a significant effect on crude protein ($p \leq 0.01$), total carbohydrate ($p \leq 0.05$), and crude fibre ($p \leq 0.05$). Organic fertilizer significantly increased total carbohydrate content, while inorganic fertilizer (NPK) led to higher crude protein and crude fibre contents. No significant differences were observed for dry matter, crude fat, or ash content.

These findings highlight the distinct impacts of organic and inorganic fertilizers on the nutritional quality of leafy vegetables grown in soilless substrates. They emphasize the importance of selecting appropriate fertilization strategies to achieve specific nutritional goals. Future research should explore optimal fertilizer blends that balance organic and inorganic sources to enhance nutritional value while reducing environmental impact.

Keywords:

Low-Cost Soilless Agriculture, Plant Waste, Charcoal, Organic Fertilizer, Inorganic Fertilizer, Leafy Vegetables, Nutritional Value, Developing Countries, Food Security.