

## Antioxidant Activity, Vitamin C Content and Growth of Chinese Kale in Response to High Humus Seedling Media and Beneficial Microorganisms

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### ABSTRACT

*Nutritional values (antioxidant activity and vitamin C content), growth and nutrient uptake of Chinese kale seedlings in response to high humus seedling media and beneficial microorganisms were evaluated in the screenhouse. Selected seedling media (SSM) were mixed with each of the three selected isolates (Azospirillum sp., Beijerinckia sp. and actinomycetes) and various percentages of leonardite. The results showed that SSM with actinomycetes plus 15% leonardite produced the highest shoot and root dry weight of Chinese kale seedling and all these values were significantly higher than the control. This treatment also produced the highest nutrient uptake (N, P, K, Ca and Mg). Furthermore, this treatment produced the highest vitamin C content (33.08 and 44.66 µg/ml) and antioxidant activity (1.9285 and 4.733 µmol trolox/g) at both the seedling stage (20 days after inoculation, or 20 DAI) and harvest time (40 days after inoculation, or 40 DAI), respectively. For Chinese kale, application of SSM with actinomycetes plus 15% leonardite not only improved plant growth and nutrient uptake but also increased nutritional values (antioxidant activity and vitamin C content) at both a seedling and at harvest. SSM with Beijerinckia sp. and 10% leonardite provided the second highest values of vitamin C content and antioxidant activity, also exceeding the control. Our results demonstrated that the improvement of vitamin C content and antioxidant activity of Chinese kale by bioorganic inputs in the production system is of interest and could lead to better consumer health.*

**Keywords:** Antioxidant, Beneficial microorganisms, Chinese kale, Leonardite, Vitamin C