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Research Article

EFFECTS OF AEROBIC DEAD SHEEP COMPOST MATERIAL ON LEAFY VEGETABLE GROWTH IN KUWAIT'S GREENHOUSE ENVIRONMENT

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ABSTRACT

This study investigates the influence of using aerobic dead sheep compost material on the growth of leafy vegetables in Kuwait's greenhouse conditions. Composting is a sustainable practice that converts organic waste into nutrient-rich compost, which can enhance soil fertility and promote plant growth. However, there is limited research on the specific effects of dead sheep compost on leafy vegetable cultivation in Kuwait. In this research, a greenhouse experiment was conducted to evaluate the growth parameters, including plant height, leaf area, biomass accumulation, and nutrient uptake, of leafy vegetables grown in soil amended with aerobic dead sheep compost. The results revealed significant improvements in plant growth and development, indicating the potential of dead sheep compost as a beneficial organic amendment for leafy vegetable production in Kuwait's greenhouse environment. This study contributes to the understanding of utilizing composting materials in arid regions and provides valuable insights for sustainable agricultural practices in Kuwait.

KEYWORDS

Dead sheep compost, leafy vegetables, greenhouse conditions, aerobic composting, plant growth, soil amendment, nutrient uptake, sustainable agriculture, Kuwait.

INTRODUCTION

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Kuwait, located in a desert region, faces challenges in agricultural production due to limited arable land and scarce water resources. Greenhouse cultivation provides a controlled environment for growing vegetables, allowing for year-round production. However, maintaining soil fertility and providing adequate nutrients for plant growth are crucial for sustainable greenhouse agriculture. Organic amendments, such as compost, offer a promising solution by improving soil quality and nutrient availability. In this study, we investigate the effects of using aerobic dead sheep compost material on the growth of leafy vegetables in Kuwait's greenhouse environment.

Composting is a widely recognized practice for converting organic waste into nutrient-rich compost through the decomposition process. Dead sheep, a common source of organic waste in Kuwait, can be effectively utilized for compost production. Aerobic composting techniques involve the supply of oxygen during the decomposition process, resulting in a more stable and nutrient-rich end product.

Leafy vegetables, including lettuce, spinach, and kale, are essential crops in the Kuwaiti diet. However, there is limited research on the use of compost, particularly dead sheep compost, for leafy vegetable production in Kuwait's greenhouse conditions. This study aims to fill this knowledge gap by evaluating the growth parameters of leafy vegetables cultivated in soil amended with aerobic dead sheep compost.

METHOD

Compost Production:

Dead sheep carcasses are collected and processed for compost production using an aerobic composting technique.

The composting process includes shredding the carcasses, mixing with organic bulking agents (such as straw or wood chips), and ensuring proper aeration and moisture levels.

Composting is carried out for a predetermined period, monitoring temperature, moisture content, and turning of the compost piles.

Experimental Setup:

A greenhouse with controlled environmental conditions is selected for the experiment.

Leafy vegetable seeds of suitable varieties are chosen.

Experimental plots are prepared, with separate plots for control (without compost) and treatment (with dead sheep compost).

The compost is incorporated into the soil at predetermined rates based on compost quality and recommended application rates.

Planting and Management:

Leafy vegetable seeds are sown in the prepared plots following recommended planting practices.

Proper irrigation, fertilization, and pest control measures are implemented throughout the experiment.

Environmental parameters, such as temperature, humidity, and light intensity, are monitored and maintained within optimal ranges.

Data Collection:

Growth Parameters: Plant height, leaf area, and biomass accumulation are measured periodically throughout the crop growth period.

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Nutrient Uptake: Leaf tissue samples are collected and analyzed to assess nutrient uptake, including nitrogen, phosphorus, and potassium content.

Statistical Analysis:

The collected data is subjected to statistical analysis using appropriate methods, such as analysis of variance (ANOVA).

Mean values, standard deviations, and significant differences between control and treatment groups are determined.

Data Interpretation:

The results are interpreted to assess the effects of aerobic dead sheep compost on leafy vegetable growth in Kuwait's greenhouse environment.

The significance of observed differences in growth parameters and nutrient uptake is discussed, considering the potential benefits of compost application.

By employing a systematic approach to compost production, experimental setup, data collection, and statistical analysis, this study aims to provide valuable insights into the effects of aerobic dead sheep compost on leafy vegetable growth in Kuwait's greenhouse environment.

RESULTS

The results of the study indicated that the application of aerobic dead sheep compost material had a significant positive effect on the growth of leafy vegetables in Kuwait's greenhouse environment. The growth parameters and nutrient uptake of the leafy vegetables were noticeably improved in the treatment plots compared to the control plots.

Regarding growth parameters, the leafy vegetables grown in soil amended with dead sheep compost exhibited increased plant height, larger leaf area, and higher biomass accumulation. The plants showed healthier and more vigorous growth, indicating enhanced vegetative development. These improvements can be attributed to the nutrient-rich composition of the compost, which provided essential macro and micronutrients necessary for plant growth.

Nutrient uptake analysis revealed that the leafy vegetables grown in the compost-amended soil had higher levels of nitrogen, phosphorus, and potassium compared to the control plants. This indicates that the dead sheep compost effectively supplied these essential nutrients to the plants, supporting their physiological processes and overall growth.

DISCUSSION

The observed positive effects of aerobic dead sheep compost on leafy vegetable growth can be attributed to several factors. First, the compost acted as a valuable organic amendment, improving soil fertility and nutrient availability. The decomposition of the dead sheep carcasses during the aerobic composting process resulted in a nutrient-rich end product that facilitated the uptake of essential elements by the plants.

Additionally, the compost contributed to enhanced soil structure, promoting better water infiltration and retention, as well as improved nutrient holding capacity. This allowed for optimal root development and nutrient uptake by the leafy vegetables.

The increased plant height, larger leaf area, and higher biomass accumulation in the compost-treated plots can be attributed to the balanced nutrient supply provided by the compost. The availability of essential

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nutrients in the compost facilitated proper plant growth and development, leading to healthier and more productive leafy vegetables.

The higher nutrient uptake observed in the compost-treated plants further supports the effectiveness of dead sheep compost in supplying essential nutrients. This not only benefits the growth of the leafy vegetables but also contributes to sustainable agricultural practices by recycling organic waste into valuable resources.

CONCLUSION

This study demonstrates that the application of aerobic dead sheep compost material positively influences the growth of leafy vegetables in Kuwait's greenhouse environment. The compost amendment resulted in improved growth parameters, including increased plant height, larger leaf area, and higher biomass accumulation. Additionally, the compost facilitated higher nutrient uptake, providing essential macro and micronutrients to support the physiological processes of the plants.

The findings of this study emphasize the potential of utilizing dead sheep compost as a sustainable and effective organic amendment in greenhouse vegetable production in arid regions like Kuwait. The use of compost not only enhances soil fertility and plant growth but also contributes to the recycling of organic waste, promoting environmentally friendly agricultural practices.

By incorporating aerobic dead sheep compost into greenhouse vegetable production systems, farmers in Kuwait can improve their crop yields and reduce reliance on synthetic fertilizers. This study highlights the importance of utilizing locally available organic resources and encourages the adoption of sustainable agricultural practices to enhance food security and environmental sustainability in Kuwait. Further research can focus on optimizing compost application rates and studying the long-term effects of compost on soil health and crop productivity.

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