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EFFECTS OF POULTRY DROPPINGS AND PIG DUNG ON CUCUMBER (*CUCUMIS SATIVUS L.)*

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ABSTRACT

This study evaluated the effects of poultry droppings and pig dung on the growth and yield of cucumber (*Cucumis sativus*). Organic amendments, including poultry droppings and pig dung, were applied to 5kg of soil at varying rates (100g, 200g, and 300g), with untreated soil serving as a control. Growth parameters such as plant height, number of leaves, and leaf breadth were monitored weekly, alongside yield indices. Soil physicochemical properties were also analyzed to determine nutrient availability and uptake efficiency. The findings revealed significant (P=0.05) differences in growth performance and yield between treatments, with pig dung at 300g producing the highest growth rates. Soil analysis indicated improved organic matter content and nutrient availability in treated soils compared to the control. The study underscores the potential of organic amendments as sustainable alternatives to chemical fertilizers for enhancing cucumber production, particularly in resource-constrained agricultural systems.

Keywords: Poultry Droppings, Pig Dung, Cucumber, Organic Amendments.

1. INTRODUCTION

The cucumber, scientifically known as *Cucumis sativus*, is a widely cultivated plant in the Cucurbitaceae family. It is a creeping vine that typically produces cylindrical fruits used as culinary vegetables. Cucumbers are considered annual plants and are commonly classified into three main types: slicing, pickling, and seedless.

Young or unripe cucumber fruits are often used as cooked vegetables or made into chutney (Grubben and Denton, 2004). They are also a rich source of minerals and vitamins (Eifediyi and Remison, 2009).

The use of organic fertilizers has gained importance due to significant benefits over chemical fertilizers. However, extensive use of veterinary antibiotics has led to the high persistence and survival of antibiotic-resistant bacteria in livestock manure, as documented by Takemura *et al.*, (2016). Similarly, Resende *et al.* (2014) reported on the prevalence and persistence of potentially pathogenic and antibiotic-resistant bacteria during anaerobic digestion treatment of cattle manure.

Low soil fertility has been identified as a major constraint affecting agriculture in Sub-Saharan Africa (Aderi *et al.*, 2011). Hence, there is a growing reliance on organic waste such as farmyard manure, crop residues, and poultry droppings for crop production. Poultry droppings have been recognized as the most valuable of all livestock manures (Omisore *et al.*, 2018). Therefore, it is essential to elucidate the effects of organic manure on plant growth to enable farmers to leverage its usage for high crop productivity and plant safety.

The main aim of this study is to evaluate the effect of organic manures on cucumber productivity and to ensure soil sustainability for continuous production.

2. MATERIALS AND METHODS

1. **Soil Preparation:**
   - Using the weighing balance, 5kg of soil were measured into each of the 24 buckets.
   - This soil was then transferred to polythene bags for mixing with treatments.
2. **Treatment Application:**
   - **Poultry Droppings:**
     - **100g (T1):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T1 were replicated three times.
     - **200g (T2):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T2 were replicated three times.
     - **300g (T3):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T3 were replicated three times.
   - **Pig Dung:**
     - **100g (T1):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T1 were replicated three times.

- **200g (T2):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T2 were replicated three times.
- **300g (T3):):** Measured and mixed with the soil in a polythene bag. Water was added to aid thorough mixing, and the mixture was poured back into its respective bucket. T3 were replicated three times.

3. **Control:** Three buckets were left untreated to serve as controls.
4. **Treatment Acclimatization:**

○ All treated soils were left undisturbed for 2 weeks to allow acclimatization and initial decomposition of organic matter before planting.

5. **Planting:**

○ After 2 weeks, 5 cucumber seeds were planted per bucket. The soil was watered immediately following planting to ensure adequate moisture for germination.

6. **Measurement of Growth Parameters:** The growth parameters measured weekly were plant height (cm), leaf length (cm), leaf width (cm), and the number of leaves per plant.
7. **Statistical Analysis:** To ascertain whether the results were significant or not, statistical analysis were performed on the values obtained from measuring the growth parameters

3. RESULTS

Table 1: Physicochemical and Metal Analysis of Soil Sample"

S/N	Sample Identity	pH	Conductivity (µS/CM)	NO_3^- (mg/kg)	TOC (%)	OM (%)	Phosphorus (mg/kg)	Nitrogen (%)	K (mg/kg)	Na (mg/kg)	Ca (mg/kg)
1	Soil	8.48	128	9.48	1.98	8.70	80.25	0.14	62.45	400.50	1,636.65

Interpretation of soil test analysis:

1. pH (8.48): The soil is alkaline. Such pH levels may limit the availability of certain nutrients (e.g., phosphorus and micronutrients) and could affect plant growth, especially for plants preferring slightly acidic to neutral soil.
2. Conductivity (128 µS/CM): Indicates low to moderate salinity levels. This is generally favorable for most crops; as excessive salinity could inhibit water absorption by plants.
3. Nitrate (NO_3^-, 9.48 mg/kg): The nitrate level is moderate. It indicates a fair amount of available nitrogen for plants, supporting their vegetative growth.
4. Total Organic Carbon (TOC, 1.98%): Reflects low organic matter. TOC is essential for soil fertility as it influences nutrient retention and availability.
5. Organic Matter (OM, 8.70%): The organic matter percentage is moderate, which positively influences soil structure and water-holding capacity.
6. Phosphorus (80.25 mg/kg): Phosphorus is present at a high level, indicating adequate availability for plant root development and flowering.
7. Nitrogen (0.14%): A low nitrogen content suggests the soil may require nitrogen supplementation for optimal crop productivity.
8. Potassium (K, 62.45 mg/kg): Moderate levels of potassium, which is vital for plant stress resistance and water regulation.
9. Sodium (Na, 400.50 mg/kg): The sodium content is elevated, which could pose a risk of soil sodicity if not managed, potentially impacting soil structure and permeability.
10. Calcium (Ca, 1,636.65 mg/kg): High calcium content suggests good soil buffering capacity and structure, benefiting overall soil fertility.

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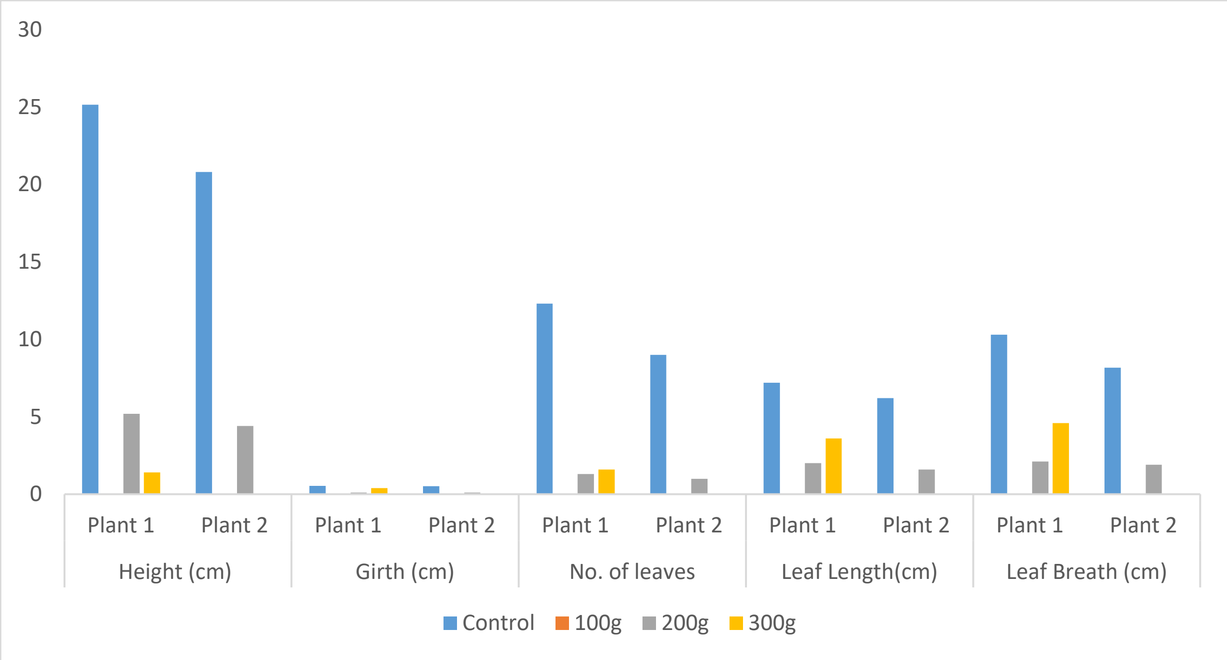

Fig 1a: The rate of growth with poultry droppings at week 5

The growth rate of plant treated with poultry droppings did well in height, number of leaves and leaf length

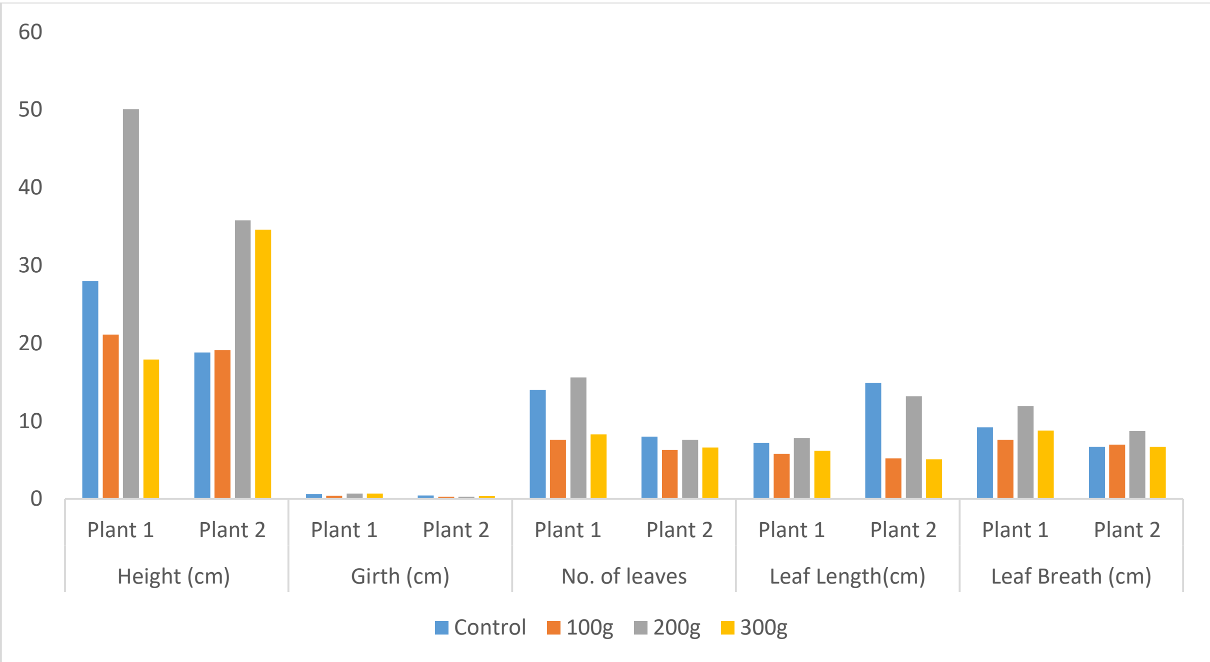

Fig 1b: The rate of growth with pig dung at week 5

The growth rate of plant 1 treated with pig dung did well in height, number of leaves, leaf length and leaf breadth.

4. DISCUSSION

The results demonstrated the efficacy of organic amendments in improving cucumber growth and yield. Treatments with pig dung consistently outperformed poultry droppings across most parameters, suggesting a higher nutrient release and soil enhancement capacity. For instance, at 300g, pig dung-treated plants exhibited the highest average height and leaf number, underscoring its effectiveness in promoting vegetative growth. Conversely, poultry droppings at similar concentrations showed moderate results, likely due to differences in nutrient composition and release dynamics.

The soil analysis corroborated these findings, with treated soils displaying increased organic matter and nitrogen content, essential for plant development. However, the elevated sodium levels observed in untreated soil highlight potential constraints on crop performance in the absence of amendments. These findings align with prior research indicating the benefits of organic manure in enhancing soil structure, microbial activity, and nutrient availability.

While both amendments improved plant performance compared to the control, pig dung's superior results suggest its suitability for cucumber cultivation in soils with similar physicochemical properties. The differences in nutrient release patterns and interaction with soil properties may explain the observed variation between the two treatments.

5. CONCLUSION

This study confirms the potential of organic amendments, specifically pig dung and poultry droppings, in enhancing cucumber growth and yield. Among the treatments, pig dung at 300g per application emerged as the most effective, significantly boosting vegetative growth and fruit production. These findings highlight the importance of organic amendments as cost-effective, environmentally friendly alternatives to chemical fertilizers. Further studies should explore long-term effects, nutrient dynamics, and economic feasibility to optimize the use of organic manure in sustainable agriculture.

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