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EFFECTIVENESS OF GOAT MANURE AND BANANA PEEL COMPOST AS ORGANIC FERTILIZERS ON CAPSICUM ANNUUM (GREEN CHILI) PERFORMANCE

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ABSTRACT

This study examined the effect of two types of organic fertilizers, goat manure and banana peel, on the growth and reproductive performance of Capsicum annuum (green chili). A combination of experimental research design with both quantitative and qualitative observations was employed. The researchers measured and recorded four parameters of chili plants namely: height, leaf number, flowering, and fruiting, at regular intervals of one week, over 45 days. Qualitative data were obtained through thematic analysis of the maintenance and vitality tracking done by the researchers. Four themes were derived from researchers' observations of the new plants: thorough land preparation, strict growth management (watering and weeding), careful monitoring of reproductive changes, and regular harvesting activities. The four themes signify that hands-on care and a good knowledge of ecology are absolutely necessary for a successful crop. The major findings indicated that the goat manure treatment was highly efficient in terms of maximum plant height, flower number, and fruit yield as compared to the control. Even though the banana peel treatment significantly contributed to plant height and leaf number, it did not have a drastic effect on flowering and fruiting. The statistical analysis also indicated that the goat manure treatment resulted in a significantly higher reproductive growth as compared to the banana peel treatment. Hence, the study recommended that chili growers should incorporate the use of goat manure as a potent organic fertilizer.

Keywords: Banana Peel, Goat Manure, Organic Fertilizers, and Capsicum annuum (Green Chili

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INTRODUCTION

Recognizing the potential of banana peel and goat dung as organic inputs may improve plant growth and soil health. Manure, with its high nitrogen content, improve the soil's structure and water-holding capacity, and banana peels, often discarded as trash, provide a natural source of potassium, which is essential for the development of strong and healthy plants. The green chili plant benefits from fertilizers such as goat dung and banana peels. Goat dung. which is rich in minerals, especially nitrogen, phosphate, and potassium, improves soil structure, boosts microbial activity, and releases nutrients gradually, all of which promote healthy growth and higher harvests. Goat manure and banana peels offer a green and inexpensive way of fertilizing crops as opposed to the highly priced inorganic fertilizers. They provide plants with essential micronutrients and major nutrients NPK (nitrogen, phosphorus, and potassium) that are indispensable for crops yield (Devanti et al., 2021; Santiso et al., 2021). While goat manure mainly functions to upgrade the structure of the soil and increase water retention (Alcedo et al., 2021; Tanmoy et al., 2024), banana peels which have 40% potassium may be turned into liquid organic fertilizers through fermentation to help in controlling environmental pollution (Wan et al., 2024; Hussein et al., 2019). The findings of the researches on chili (Capsicum annuum L.) reveal that chemical fertilizers are directly associated with leaf area and leaf weight but organics are used for the continuation of soil fertility and thus, the maintenance of life on earth (Desi et al., 2025; Alam & Ahmed, 2020). Due to the profitability of the chili crop and its huge demand worldwide as a seasoning, it becomes very necessary to use such green fertilization methods thereby making a positive contribution to the sustainability of tropical agriculture (Tripodi & Kumar, 2019; Jarret et al., 2019). This study examined the effectiveness of goat dung and banana peel in the growth and production of (Capsicum annuum L.) green chili. This undertaking about composted fertilizers, such as banana peel and goat manure fertilizer, showed that goat droppings and banana peels can be used as fertilizer for green chili plants. This study will help farmers to avoid using chemical fertilizers. They will save more and be better for the soil and plants. This will also help other farmers who want to research or do studies about organic fertilizers.

RESEARCH PROBLEM

The researchers aimed to determine the effectiveness of goat dung and banana peel on the growth and production of the green chili.

Specifically, this study sought answers to the following questions:

OBJECTIVES:

1. How may the effectiveness of the goat dung, banana pill, and control group on the green chili growth production be described in terms of: 1height; number of leaves;
   1.3 number of flowers; and

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1.4number of fruits?

2. Is there a significant difference between the goat dung, banana peel, and the control group in the chili growth production?
3. How do the researchers utilize physical growth indicators (such as leaf, stem height, and fruit development) to assess and analyze the overall health status of the plants?

HYPOTHESIS

There is no significant difference between the goat dung and the banana peel and the chili growth production.

MATERIAL AND METHODS

This investigation was conducted in Magalang, Pampanga, during the period of June to September 2025, with the aim to determine the effect of organic fertilizers on the growth of green chili (Capsicum annuum L.). The experiment was a Randomized Complete Block Design (RCBD) with six replications, wherein the treatments were a control plot (T0), banana peel (T1), and goat manure (T2) only. The usage of organics was done from basal to topdressing along with a 7, 14 days rest to allow nutrients to release and to prevent root burn. The researchers also measured the development parameters (leaf area, crop growth rate, fruit weight, etc.) of 20, plant plots. The article highlights the utilization of green fertilizing methods as a means of achieving higher yields in chili production.

STATISTICAL TREATMENT AND DATA ANALYSIS

This study has evaluated the effects of banana peel and goat manure on green chili growth through a mixed, methods approach. Quantitative data (height, leaves, flowers, fruits) were statistically tested by computing Mean, Standard Deviation, and one, way ANOVA in Microsoft Excel at 0. 05 level of significance. Observation notes as a qualitative data were going through Braun and Clarkes thematic analysis for the identification of the main management themes.

RESULTS

The research reveals that the use of organic treatments considerably promotes the development of Capsicum annuum. As a matter of fact, the goat's treatment plants grew the tallest, with their height peaking at 19 inches, whereas the banana plants treatment were of moderate growth but not very consistent. Compared to these, the control group was the shortest, with heights ranging from 8 to 14 inches. The main reason behind its top performance is that the goat treatment has high levels of the most important macro, nutrients such as Nitrogen (N), Phosphorus (P), and Potassium (K), as well as organic matter that enrich the soil thereby impacting the vegetative growth (Ibitoye et al. , 2020).

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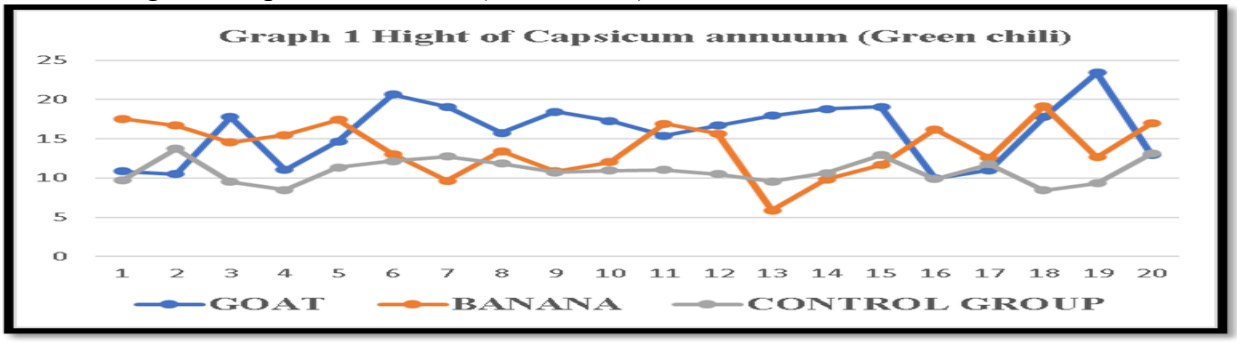
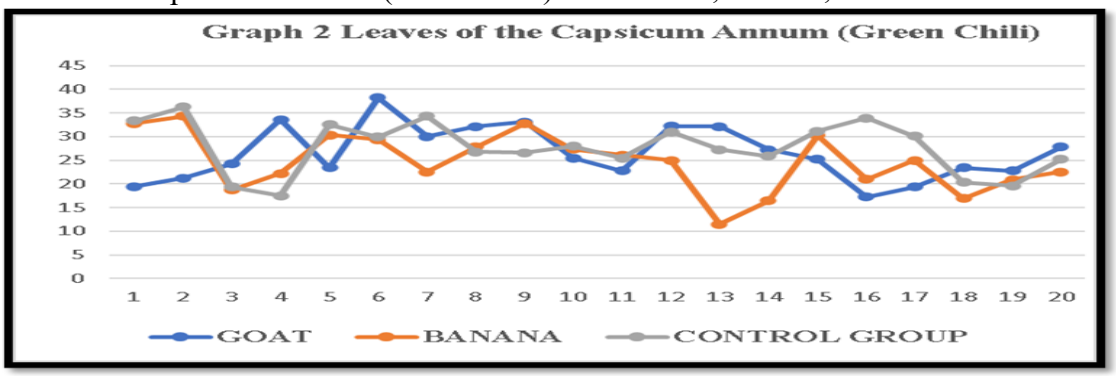
Table 1: Height of Capsicum annuum (Green Chili) Under Goat, Banana, and Control Treatment



During a period of 45 days, the growth of Capsicum annuum was monitored and the results demonstrated that growth patterns differed widely among the different treatment groups. The goat manure treatment recorded the highest number of leaves at one time, which was 39 leaves, thus showing that it is very effective in stimulating vegetative growth at the early stages. This result is not surprising given that goat manure is rich in nitrogen, which is a nutrient required in the production of chlorophyll and the growth of leaves. On the other hand, the control group was the most stable in terms of growth and it was able to maintain a leaf number of more than 27 leaves all through the period. The banana group, however, was very unstable since at one time it had only 11 leaves which was the lowest in the whole study. The results are thus suggesting that although organic amendments such as goat dung can give rise to rapid growth the control environment was more conducive to long, term stability. At the end of the day, it is well known that goat manure is a great source of nutrients and hence if green chili plants are given such an environment, their vegetative growth (leaf production) will be significantly improved (Awodun et al., 2007; Kahar, 2019).

Table 2: Leaves of Capsicum annuum (Green Chili) Under Goat, Banana, and Control Treatment



During a 45, day experiment of Capsicum annuum, the goat manure treatment was the most effective in stimulating reproductive growth among the other treatments. By the goat treatment, the flowering peaks were the highest with a maximum of 17 flowers in the first period and 15 in the thirteenth, thus, it could be judged as the most effective treatment in promoting flowering. On the other

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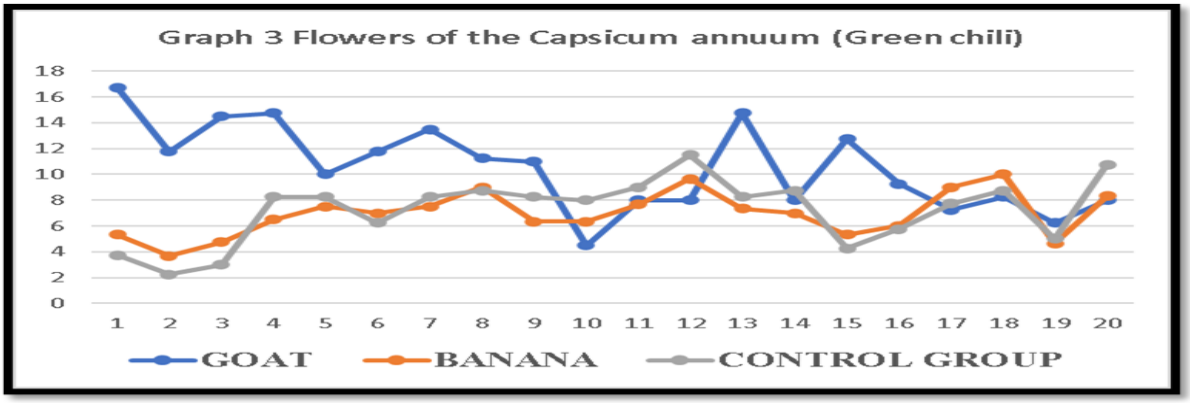
hand, the banana and control groups were fluctuating at a significantly lower level, generally staying between 4 and 10 flowers. Although these groups reached their peaks later in the cycle, their flowering level was far from the goat, treated plants. This difference in performance puts emphasis on the role of nutrients in goat manure, especially Phosphorus and Potassium, which are the most important elements for flower development. The results support the fact that goat manure increases the flowering and fruiting potential of green chili plants to the greatest extent as compared to the unfertilized controls (Tiamiyu et al., 2018). Flowers of Capsicum annuum (Green Chili) Under Goat, Banana, and Control Treatment



The graph presents the changes in the number of fruits produced by Capsicum annuum (green chili) plants under the goat, banana, and control treatments. Overall, the goat treatment blue line produced the highest number of fruits, reaching the overall maximum of 6.7 fruits in period 11 and consistently displaying high counts early and in the middle of the observation period. The control group gray line was highly competitive, maintaining a very stable and high fruit count throughout the cycle and reaching a peak of 5 fruits in period 17. The banana treatment orange line consistently showed the lowest fruit counts, rarely exceeding 4 fruits, and had the lowest overall points in periods 10 and 20. This suggests that the goat treatment is the most effective in driving the conversion of flowers into actual fruits. The control group's strong and stable performance suggests that natural soil fertility or environmental factors provided a highly suitable base for consistent fruit setting, nearly matching the goat treatment's peaks. The banana treatment appears to be the least suitable for maximizing final fruit yield. The data showing the goat treatment leading to the highest number of fruits is strongly supported by research on organic fertilizers for fruiting crops. Goat manure provides a balanced supply of macro-nutrients, particularly Phosphorus (P) and Potassium (K), which are vital for the fruit setting, development, and maturation stages of Capsicum annuum. Studies have confirmed that the application of goat manure significantly increases the final fruit yield and fruit weight compared to controls due to its ability to improve soil structure and sustained nutrient release (Olatunji and Obasola, 2013).

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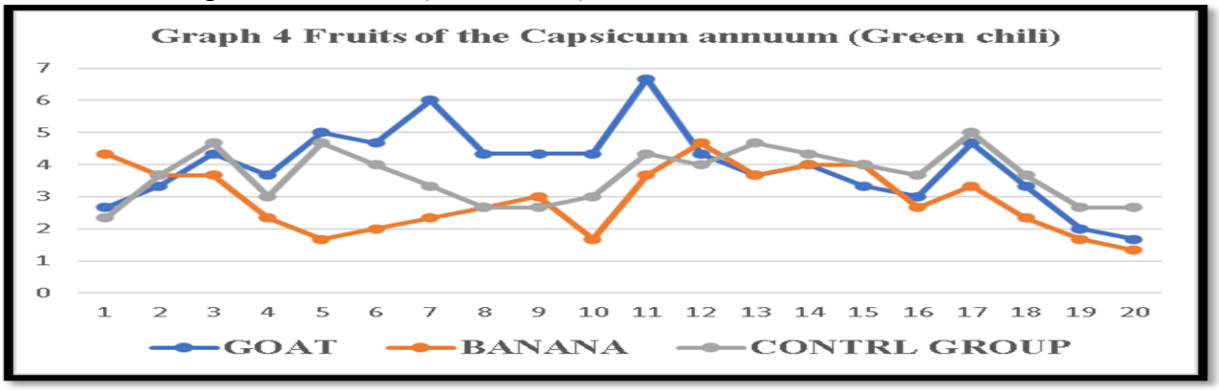
Table 4: Fruits of Capsicum annuum (Green Chili) Under Goat, Banana, and Control Treatment



The comparison between the Control group vs the Goat treatment showed significant differences in Height (p = 0.00), Flowers (p = 0.00), and Fruits (p = 0.03), suggesting that the Goat treatment had a substantial effect on plant growth and reproductive attributes compared to the control, while differences in Leaves (p = 0.89) were not significant. Similarly, when comparing the Control group vs Banana peel treatment, significant differences were observed for Height (p = 0.03) and Leaves (p = 0.02), indicating a beneficial effect on these vegetative attributes. However, the Banana peel treatment did not show a statistically significant difference from the control in either Flowers (p = 0.32) or Fruits (p = 0.10). Finally, the direct comparison between the two treatment groups, Goat vs. Banana peel, revealed highly significant differences in Flowers (p = 0.00) and Fruits (p = 0.00), suggesting a superior effect of the Goat treatment on reproductive attributes. Conversely, there were no significant differences in Height (p = 0.30) or Leaves (p = 0.91) between the Goat and Banana peel groups. Overall, both treatments positively affected plant Height compared to the control, but the Goat treatment demonstrated a significantly stronger impact on the production of Flowers and Fruits across all comparisons.

Significant difference between the goat dung, banana peel, and control group in the chili growth production

			P- Value	
Treatment	Height	Leaves	Flowers	Fruits
Control group vs Goat	0.00*	0.89	0.00*	0.03*
Control group vs Banana peel	0.03*	0.02*	0.32	0.10
Goat vs Banana peel	0.30	0.91	0.00*	0.00*

Legend: * Significant

Description on Measuring Plant Vitality, Tracking Growth Health

The information presented illustrates that the farmers in the study fully integrated ecological methods with conventional agriculture. Farmers paid great attention to each stage

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of plant growth throughout the plant cycle. At start, up, the farmers consider land clearing and soil nutrition as the main source of plants for survival, which is in line with both ecological and conventional agricultural standards. As the plants grow, the farmers have shown a very high level of responsibility and care in maintaining the plants, such as through watering, weeding, and providing support, which not only helped the plants to be healthy but also provided a great learning opportunity for the farmers. Later on, it became a more advanced phase of observing and diagnosing where the farmers traced the plant transition from flowering to fruiting and also performed their pest and disease diagnostic tests in order to get a good quality yield. In the end, the farmers were very skilful in sanitation and strategic harvesting, and the result showed that a perfect combination of early, stage thorough preparation, active growth management, and well, timed intervention is the key to the highest agricultural output.

DISCUSSION

The findings reveal that the use of organic fertilizers has a significant effect on the phenological growth process of Capsicum annuum and among the various amendments, goat manure was found to be the best. The goat treatment's advantage in height (19 inches) and reproductive output reaching 17 flowers and 6. 7 fruits can be explained from its high Nitrogen (N) level, which promotes vegetative growth, and Phosphorus (P) and Potassium (K), which ensure reproductive success. The goat treatment also had statistically significant differences from the control treatment in height (p = 0. 00$), flowers (p = 0. 00), and fruits (p = 0. 03), thereby confirming its contribution to biomass production and yield. The banana peel treatment, however, not only increased the height and leaf number (p = 0. 02) but also had a very high volatility and no significant effect on flowering and fruiting (p = 0. 32), hence, it is most likely that this treatment does not have the right combination of nutrients that are needed during the reproductive phase. In fact, the control plot's consistent leaf retention and fruit setting indicate that whereas organic fertilizers result in 'growth spurts, ' proper agronomic practices such as the weeding and watering carried out by the farmers are indispensable for maintaining plant health.

CONCLUSION

The research results indicate that among various organic nutrient sources, goat manure brings a significantly larger increment to the growth and flowering phases of Capsicum annuum than the other treatments used in the experiment. In the paper, a distinctly ordered list of effects of the different treatment on the plant is shown: goat manure is the best that can be used to encourage the plants to convert their flowers into fruits, whereas banana peels are only good for supporting the initial vegetative stage of the plants (Devi et al., 2022). Nevertheless, the figures based on different indicators demonstrate that the results of the application of fertilizers are most successful when the farmers' care is

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at an exemplary level. The use of high, nutrient organic matter combined with the good practice of systematic care, from soil preparation to pest diagnosis.

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