

EVALUATING CARABAO MANURE AND RICE HUSK AS SUSTAINABLE ORGANIC FERTILIZER FOR CHILI PEPPER

Author's Name: Nunag, King Joseph D. Lacson, Jaycee M. Albay, Alvin F. Dizon, Whestlee O. Laxamana, Rheiley Rex D. Santiago, Leenard Paul B. Turla, John Carlo S. Ibay, Cristel Mae M. Lacamora, Zandy L. Dominado, Noel L. Ed.D.

Affiliation:

Senior High School Master Teacher, Department of Education-Pampanga, Philippines
Adjunct Profession at Pampanga State University and Philippine Christian University

Corresponding Author Email Id: christmasdominado@yahoo.com

ABSTRACT

*This paper examined the effects of organic soil amendments namely pure carabao manure and the rice husk, carabao manure mixture on chili pepper (*Capsicum annum*) growth and yield. It primarily adopted a field experimental framework but qualitative observations were also used. Three treatments, namely, the control, mixed treatment, and pure manure were subjected to measurements of plant height, leaf count, flowering, and fruit production. Findings demonstrated that the treatments had no significant effect on plant height but on yield, the effect was significant. For vegetative and reproductive growth, pure carabao manure was the best promoter and this was proved by the number of leaves (around 50) and the yield of the fruits, 12 to 13 fruits per plant. Notwithstanding, the rice husk mixture was the best at flower induction (12 flowers), however, this did not result in a large number of fruits. Qualitative findings showed that although the fertility of the soil had been improved, the fruit drop was a consequence of environmental factors such as pests and weather. The study purports that pure carabao manure is the best organic deterrent that is capable of boosting chili yield to the maximum.*

Keywords: Carabao Manure, Chili Pepper, Organic Fertilizer, Rice Husk

INTRODUCTION

The main goal of this research was to determine how rice husk and carabao manure affect the yield of chili pepper. Moreover, it intended to examine the combined impact of these two materials as an alternative organic component for the production of chili peppers. Mixing rice husk with carabao manure may be a green way of promoting chili production. Rice husk biochar is credited with increasing soil fertility, nutrient holding capacity, and salt stress tolerance (Taskin et al., 2023; Sahin et al., 2024). In addition, the silica compounds taken out of it can be used to make fertilizers that are environmentally friendly (Kordi et al., 2025; Karam et al., 2022). Conversely, carabao manure is very good at restoring the soil's physical properties and encouraging the growth of vegetables (Teoso et al. , 2020; Tuan, 2019). There have been experiments uncovering the fact that, these organic amendments have not only increased significantly the growth but also the yields of chili (Hariani, 2023; Boress et al. , 2023; Idrees et al. , 2020). Through the utilization of these biomass residues (Palcullo et al. , 2021; Albito et al. , 2023), small scale farmers can get very productive, less reliant on external inputs and more sustainable in eco, agriculture (Jung et al. , 2024). This study was designed to determine the successive effect of carabao manure and rice husk as organic fertilizer on the yield of chili pepper. The research results enlightened the farmers especially the small farmers and community on the effectiveness of carabao manure and rice husk as organic fertilizers in chili production, thus providing novelty knowledge to them.

RESEARCH PROBLEM

The researchers aimed to assess the effects of carabao manure, rice husk mixed with carabao manure, and control group to the chili pepper production.

OBJECTIVES

Specifically, the study sought answers to the following question:

1. How may the effectiveness of the carabao manure, and rice husk mixed with carabao manure, and control group on the chili pepper production be described in terms of: height; number of leaves; number of flowers; and number of fruits?
2. Is there a significant difference among the carabao manure, rice husk mixed with carabao manure, and the control group?
3. To what extent do factors such as organic soil amendments, environmental weather conditions, and regular maintenance practices influence the yield and toughness of a garden plot?

HYPOTHESIS

There is no significant difference among the carabao manure, rice husk mixed with carabao manure, and the control group?

MATERIALS AND METHOD

The operation was carried out at Barangay San Pedro 2, Magalang, Pampanga, from July to September 2025. The Randomized Block Design (RBD) experiment was set up to utilize various tools such as a hand trowel, a shovel, and a hoe. Carabao manure served as the fertilizer application. Most importantly, the rice husk was made from the outer layer of rice grains. The fertilizer was spread over the plant by pouring it on. The experiment involved only a particular organic fertilizer, with two and no treatments. The combination of carabao manure and carabao dung with rice husk are two such treatments. The plants were harvested to determine the performance of certain parameters: fruit weight per plot, crop growth rate (CGR), and leaf area (LA). There are 10 plants in an allotment of 914 cm x 30 cm. 52 x 30 cm is the spacing between and within each row. A chili pepper is ready to be picked when it has a waxy, glossy appearance, when it is a little bit faded red color, and when it has a pointed shape.

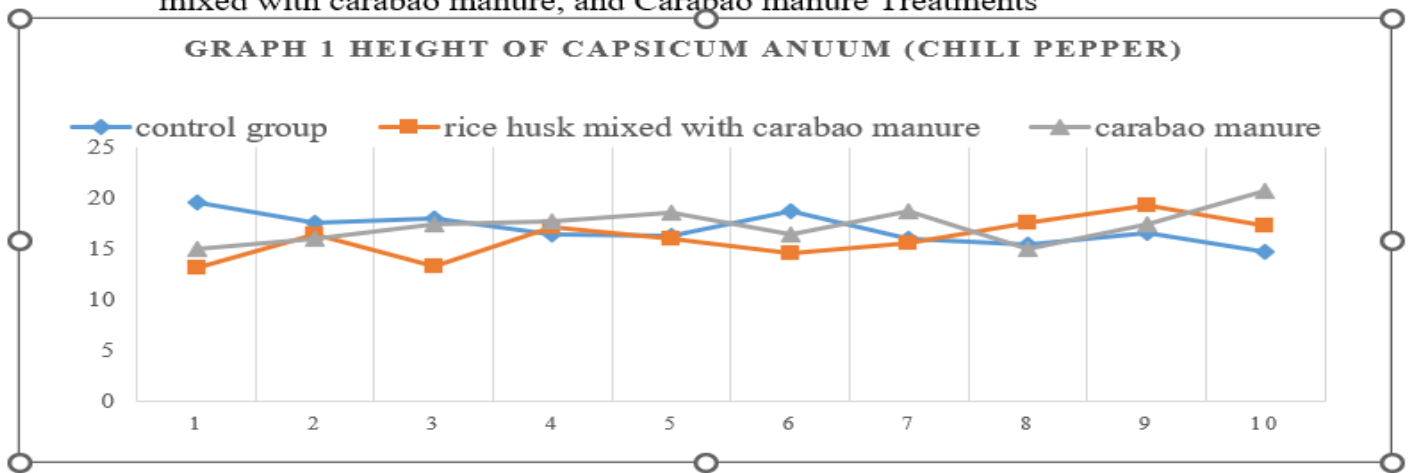
STATISTICAL TREATMENT AND DATA ANALYSIS

The data collected were analyzed using the Microsoft Excel. The average height, leaves, flowers, and fruit of chili pepper plants in each treatment group were computed using the mean formula. A one-way Analysis of Variance (ANOVA) was used to determine if there were significant differences among the groups. The results were interpreted at a 0.05 level of significance. The statistical treatments used in this study were the analysis of variants, known as ANOVA, for testing the differences between the three treatments. The Mean was used to get the carabao manure, rice husk mixed with carabao manure, and no treatment average of the sample plants. The qualitative phase was the observation narrative of the researchers from day 1 of crop production and Braun and Clarke's (2006) thematic analysis was adopted in the interpretation of the narrative.

RESULTS

This graph represents the variations in height of *Capsicum annuum* (Chili pepper) under three treatments: control group, rice husk mixed with carabao manure, and carabao manure. The carabao manure plot consistently produced the tallest plants, ending above 20 inches at the end. The rice husk mixture showed modest but slightly fluctuating growth, while the control plot was the lowest and mostly hovered between 15 and 18 inches. By and large, among the treatments tested carabao manure resulted in the highest yields in terms of height and the rice husk mixed with carabao manure came next whereas the control group exhibited the least improvement. Using animal manures, for instance, carabao manure, is a means of raising soil fertility in acid soils and thereby enhancing nutrient uptake particularly potassium, phosphorus, and nitrogen (Rollon et al, 2020).

Graph 1: Height of *Capsicum annuum* (Chili Pepper) Under Control group, Rice husk mixed with carabao manure, and Carabao manure Treatments



Results in Graph 2 showed that the control group initially started with a higher number of leaves and the peak were at about 63 leaves, slowly decreasing to about 35 leaves at the last observation. The rice husk combined with carabao manure leaves remained lower, only in the range of about 30 to 40 leaves. On the other hand, pure carabao manure treatment slowly increased to end with the highest leaf number of around 48, 50 leaves, thus showing better and more stable leaf production than the other treatments. Carabao manure contains a high concentration of nitrogen (N), phosphorus (P), and potassium (K), which are the main nutrients for leaf production and photosynthesis (Galindez et al, 2017).

Graph 2: Leaves of *Capsicum annuum* (Chili Pepper) Under Control group, Rice husk mixed with carabao manure, and Carabao manure Treatments

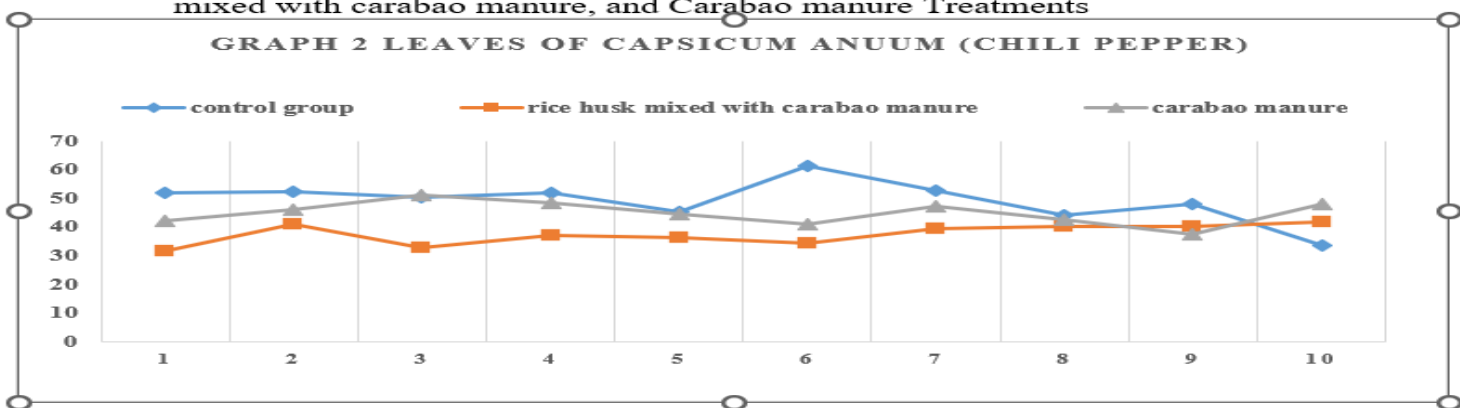
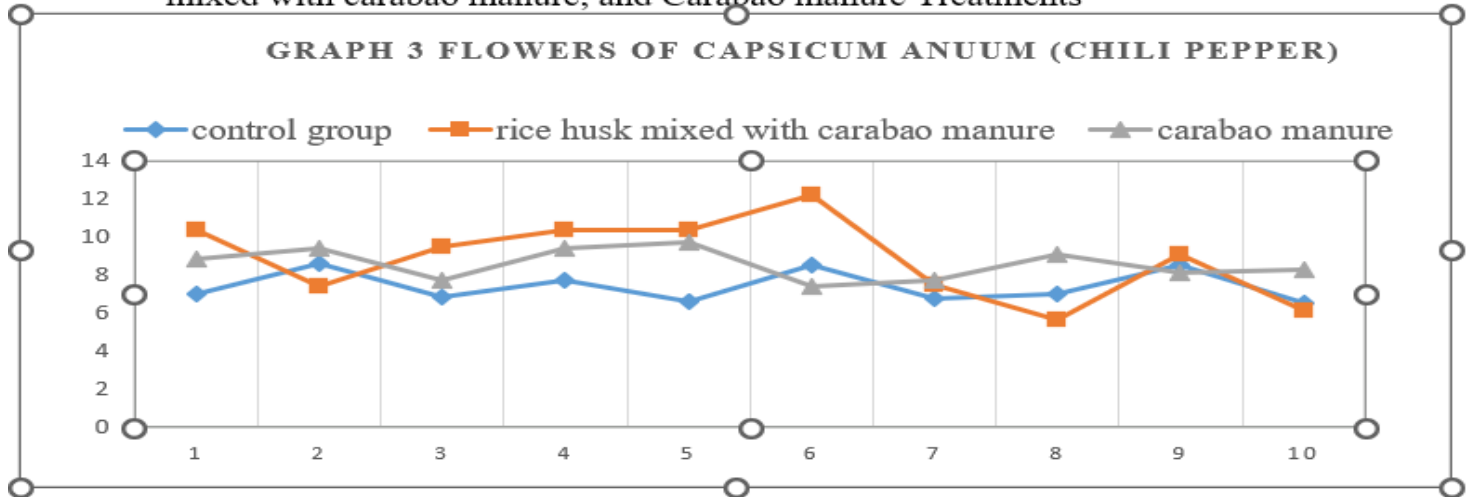


Figure 3 showed the number of flowers produced by *Capsicum annuum* (Chili pepper) under three different treatments in units of flower count. The rice husk mixed with carabao manure resulted in the highest flower numbers, going up to about 12 flowers. However, the carabao manure treatment had moderate and constant values at about 8–10 flowers, whereas the control group recorded the lowest counts, mostly between 7 and 9 flowers. Overall, the mixed treatment resulted in the greatest flowering compared to the other groups. By controlling soil characteristics and releasing beneficial elements, rice husk biochar has been shown to be

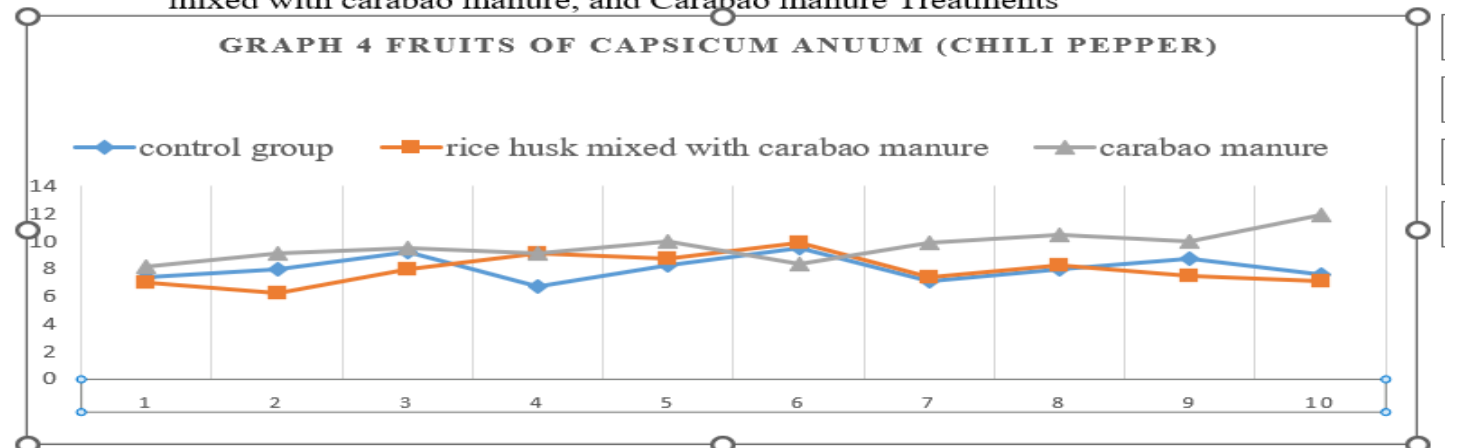
efficient in absorbing organic matter, lowering pollutant availability, and improving crop development (Li, et al, 2023).

Graph 3: Flowers of *Capsicum annuum* (Chili Pepper) Under Control group, Rice husk mixed with carabao manure, and Carabao manure Treatments



The chart shows fruit numbers produced by *Capsicum annuum* under the influence of three different treatments. If fruit number was a measure, the carabao manure treatment would have been the most successful as it produced a crop of about 1213 fruits. The mixture of rice husk and carabao manure yielded mediocre fruit counts, which were around 710 fruits, whereas the control group was the least productive group, mostly between 7 and 9 fruits. By and large, carabao manure dominated the fruit production of the other treatments. Applying phosphorus in combination with carabao manure not only led to the accumulation of soil organic phosphorus (P) but also significantly influenced the number of plants and seed yield that were notably higher (Capote & Baoc, 2021).

Graph 4: Fruits of *Capsicum annuum* (Chili Pepper) Under Control group, Rice husk mixed with carabao manure, and Carabao manure Treatments



The following table gives the p-values that compare the impact of the three different treatments-control, rice husk mixed with carabao manure, and pure carabao manure-on the growth parameters of chili pepper. As

illustrated, it can be said that when it comes to plant height, most treatments are not significantly different, as the p-values were 0.24 for Control vs. Rice husk mixed with carabao manure, 0.64 for Control vs. Carabao manure, and 0.14 for Rice husk mixed with carabao manure vs. Carabao manure. On the other hand, it is quite clear that the significant differences showed up in the number of leaves produced. The p-values were 0.00 in both cases: between Control vs. Rice husk mixed with carabao manure and between Rice husk mixed with carabao manure vs. Carabao manure, showing a strong influence of fertilizer application on the development of leaves. In respect to flower production, the p-value of 0.06 for Control vs. Rice husk mixed with carabao manure showed that there is no significant difference, whereas the p-value for Control vs. Carabao manure was 0.00, indicating a highly significant effect, while Rice husk mixed with carabao manure vs. Carabao manure had a p-value of 0.69, which means no significant difference. The last one, fruit production, showed a strong significance in treatments involving manure: p-values were 0.76 for Control vs. Rice husk mixed with carabao manure, 0.00 for Control vs. Carabao manure, and 0.00 for Rice husk mixed with carabao manure vs. Carabao manure.

Table 1. significant difference among the carabao manure, rice husk mixed with carabao manure, and the control group

Treatment	<i>p-Value</i>			
	Height	Leaves	Flowers	Fruits
Control Group vs mixed rice husk and carabao manure	0.24	0.00**	0.06	0.76
Control Group vs carabao manure	0.64	0.12	0.00**	0.00**
Mixed rice husk and carabao manure vs carabao manure	0.14	0.00**	0.69	0.00**

Legend: **significant

Description on Practices Influence the Yield and Toughness of a Garden Plot.

Theme 1: Manure Makes the Difference in Plant Growth

At first, the garden did very well because of the rich natural soil and the carabao manure that gave it a very strong one. However, environmental factors and negligence kept causing the project to be troubled. Floods and long absences gave weeds an opportunity to grow very fast, thus competing for nutrients and resulting in some plants getting dried up or killed, while litter and insects especially ants also made the plots less nice. On top of that, there were also some discrepancies on which fertilizers encouraged the fruits best. However, a bit of the challenge helped to bring out the stronger carabao manure and rice husk that were their successes; these organic inputs were the only factors that led to the bountiful harvest of chili peppers and hence showed that appropriate soil nourishment plays an important role in sustaining a flourishing landscape.

Theme 2: The Impact of Weather on Crop Production

Consequently, the garden suffered greatly as the crops' health and robustness were severely affected by a mixture of extreme weather and pest infestation. On the one hand, incessant heavy rain and strong winds caused the fall of several plants. On the other hand, the alternating cycle of rain and scorching sunlight did so much damage to the plants that they withered, dropped leaves, or produced unripe fruit that dropped prematurely. Moreover, in addition to these natural calamities, the garden, floor plots were first, aided by ant infestations and insects of different kinds, with plant, facing, fertilizer, of, fertilized, plants being particularly vulnerable to insect attack. When suf, pmd was absent from the garden in the rainy season, weeds grew and choked the plots to such an extent that the whole area was rendered unstable and infested with wild growth making it quite difficult to manage, which consequently hampered the produce growth and ripening.

Theme 3: Stem Health and Fruit Maturity: Big Factors for a Good Crop

The garden's output was severely reduced due to a combination of tough weather and biological competition, as heavy rains and temperature fluctuations made a lot of plants to wilt or shed leaves. The crops had enough capacity to bear a large quantity of fruits, however, due to the unstable weather, the fruits could not fully mature, thus, the majority of the harvest was either green or spoiled and attracted different kinds of insects.

DISCUSSION

The experimental data of *Capsicum annum* shows that organic amendments, especially pure carabao manure, have a great capability to develop growth and productivity in the experimental crop as compared to the mixtures of rice husk and control groups. The height of the plant was a little bit different in the first batch of experiments, but in the case of manure plots, the plant height was always more than 20 inches and the upward trends in the length of the plant on the plots with manure were consistent. P, values ranged ($p=0.24$ to 0.64) and in general, the differences in the height of the plant were not statistically significant. The major effect of manure can be seen in the total biomass and reproductive success. Carabao manure encouraged the growth of leaves to a greater extent which was evident from the total count of leaves that reached approximately 50 leaves. The fruit yield was also dominated with 12, 13 fruits per plant, which is very well confirmed by a very high level of statistical significance in the value of p, 11 controls versus treatment ($p=0.00$). Interestingly, the mixed formulation of rice husk and manure was top in flowering (12 flowers/plant), but it could not translate into the highest fruit production as the "mediocre" fruit set was observed. Without negating the contribution of soil nourishment through plant nutrients, the exploration of environmental themes seems to suggest that the potential of the garden was quite limited by several external stress factors, continuous rain, very hot weather, and pest attack. The drastic leaf drop shown by the control

group and the presence of unripe and spoiled fruit in all the plots are further indicators that carabao manure can provide a good nutrient base but it cannot be a complete buffer against extreme weather and the challenge of weeds in the case of a competition for resources. It is basically the data themselves that bring out the main point organic fertilization with carabao manure is, of course, a necessary condition

CONCLUSION

The experiment findings on *Capsicum annum* revealed that pure carabao manure is the best single, source organic amendment for the improvement of its growth and productivity. Even though plant height was rising all the time and had exceeded 20 inches, the strongest manifestation was in the biomass and reproductive success, where the leaves attained 50 in number and the fruits yielded on average 12, 13 per plant, $p=0.00$. Besides that, rice husk mixtures made the greatest number of flowers but the fruit production was not as good as for pure manure. On the other hand, manure simply supplies nutrients and cannot totally defend plants from pests and unfavorable weather conditions, which cause leaf dropping and fruit decay in all groups. Hence, carabao manure is a vital nutrient source. Nevertheless, the use of integrated management to reduce environmental problems' impact is required to achieve the highest yields.

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