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EXPERIMENTAL EVALUATION OF VEGETABLE AND FRUIT JUICE AS ORGANIC MANURE ON THE GROWTH AND YIELD OF TOMATO (SOLANUM LYCOPERSICON)

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ABSTRACT

This research presents a thorough assessment of the use of organic amendments with a focus on fruit and vegetable waste (FVW) compost, to improve plant growth and enhance reproduction of Solanum Lycopersicon (tomato). Methodologically, the study is characterized by an experimental research design that was further enriched by qualitative observation narratives, and thus it contrasts the effects of FVW compost, green manure, and a control group. The results on a quantitative level demonstrated that FVW compost was a highly potent organic agent facilitating initial propagation, as the treated plants not only showed greater height but also a larger number of leaves and flower initiation at a statistically significant level (p=0. 01). The reason behind this excellent performance was the high content of the essential macronutrients Nitrogen (N), Phosphorus (P), and Potassium (K) in the waste matter. On the other hand, based on qualitative observations, it emerged that an FVW compost, although able to unleash the greatest vegetative vigor, still had its vulnerability to weather variations and pest attack. Moreover, it was found that green manure had the greatest effect on the fruit yield, thus indicating that the total yield and plant height might be at least partially dependent on the plants genetic potential or the rate of nutrient release rather than the initial organic boosting only. The paper argues that the success of the yield is the result of an integrative "systems approach" whereby the initial soil conditioning sets the stage for the maximal utilization of the resources. From a practical standpoint, it is advisable for farmers to implement a sequential nutrient strategy: implementing FVW compost during the early vegetative stages for the growth of the plant structure, followed by green manure or potassium, based fertilizers during the fruit, setting phase.

Keywords: Fruit Juice, Growth, Vegetable, Organic Manure, Tomato, Yield

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INTRODUCTION

This research is about the use of organic fertilizer through the help of leftover vegetables and fruits that are no longer useful or can't be served anymore. Basically, the topic of this study is moving towards the application of green manure and fruits and vegetables manure which helps soil to become enriched and at the same time synthetic fertilizers can be avoided. Research shows that fruit and vegetable waste (FVW) is an excellent organic fertilizer that greatly improves the soil and its sustainability through compost. According to studies, composting market waste can produce more than 650, 000 tons of fertilizer yearly, and it matures in 60 days (Puntsag et al., 2022). Using these organic materials, especially on tropical Oxisols, can raise the soil's organic carbon up to 25% and the nitrogen content even up to 35% (Musa et al., 2020). Besides, different developments such as liquid organic fertilizers and nutrient, rich flours made from onion and fruit peels, have been able to show better yields and nutritional aspects of crops like lettuce (Novriyansyah, 2025). Notably, in the Philippines, recycling of household and market waste is considered to have double benefits of lessening pollution and increasing crop production (Sharma et al., 2019). In view of the fact that the tomato industry a major source of economic growth is confronted with issues such as the high percentage of processing waste (10, 18%) and the impact of climate stress, the adoption of these green soil management techniques becomes not only a matter of agricultural productivity but also one of soil health restoration maters (David et al., 2024; Conti et al., 2023).

The aim of this study was to promote the use of organic fertilizers such as the application of green manure which can balance soil pH and also has antimicrobial effects. It also identified fruits and vegetables manure to improve soil structure, and to increase water retention. This research was about organic manures such as fruit and vegetable manure and green manure, which help the farmers to make their crops and yields safe. Also, because of this organic manure, it reduces the cost to farmers of purchasing manure mixed with chemicals.

RESEARCH PROBLEM

The researchers aimed to determine the effectiveness of fruit and vegetable and green manure on the growth performance of tomato. Specifically, this study sought answers to the following question:

1. How may the effectiveness of fruit and vegetable, green manure, and control group on the tomato growth production be described in terms of height; number of leaves; number of flowers; and number of fruits?
2. Is there a significant difference between the fruit and vegetable manure, green manure, and control group in the tomato growth production?

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3. How much does the consistency in soil preparation during early, stage and post, planting maintenance (monitoring and weeding) directly affect the shift from vegetative growth to reproductive success (flowering and fruiting) in crop production?

HYPOTHESIS

There is no significant difference between the fruit and vegetable manure and green manure and the tomato growth production.

MATERIALS AND METHOD

The study was carried out from July to September 2025 at San Pedro 2, Magalang, Pampanga. A variety of tools were used in the Randomized Block Design (RBD) experimental study, including hoe, rake, and spade, watering cans, measuring tape, sprayer, protective gloves and boots. The study's necessary materials included Solanum Lycopersicon (Tomato) plant, fruit and vegetable manure, green manure, garden soil, water supply. There is a fertilizer application such as fruit and vegetable manure and green manure. Notably, the fruit and vegetable manure, and green manure were made using hoe, rake, and spade, watering cans, measuring tape, sprayer, protective gloves and boots. Had a composition of the resting time 7 to 14 days after basal application of fertilizer especially organic fertilizers like fruit and vegetables or green manure compost is important for several reasons, to avoids root burn, allows decomposition and nutrient release, and reduces harmful pathogens and weed seeds. Additional topdressings were done at 20 days after transplanting using the same respective organic fertilizers for each treatment. fertilizer will be applied using fruit and vegetable and green manure.

Three treatments were used in the trial, which employed a randomized block design and repeat six times. These treatments include: The following values are obtained from organic fertilizer waste: T0 = no organic fertilizer, T1 = 1kilo green manure, T2 = 1kilo fruit and vegetable manure. When the plants were harvested, the following metrics were measured: leaf area (LA), leaf area index (LAI), net assimilation rate (NAR), crop growth rate (CGR), and fruit weight per plot. There are 20 plants per plot, with a single plot measuring 100 x 500 cm. The spacing between each row and inside each row is 50 x 40 cm.

STATISTICAL TREATMENT AND DATA ANALYSIS

The data collected were analyzed using Microsoft Excel. The average height and weight of eggplant plants in each treatment group was computed using the mean formula. A one-way Analysis of Variance (ANOVA) was used to determine if there were significant differences among

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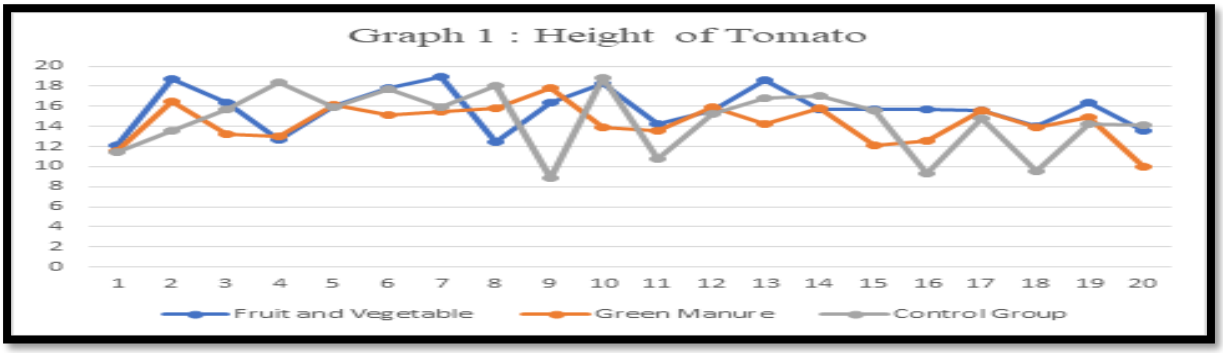
the groups. The results were interpreted at a 0.05 level of significance. The statistical treatments used this study were the Bonferroni, and the analysis of variants known as ANOVA, for testing the differences between the three treatments. The Mean was used to get the cow and pig' s average intake of the sample feeds. In this study, the qualitative observation narrative was analyzed using the Braun and Clark (2006) thematic analysis model.

RESULTS

This graph shows the height variations of salanum Lycopersicon (tomato) plants treated with different substances: fruit and vegetable, green, and a control group. overall, the fruit and vegetables treatment led to the highest and most fluctuating plant heights, with several peaks reaching above 18 inches. green treatment shows exactly 18 inches but has more irregular declines, especially in the middle of the season. the control group are the same height as fruit and vegetables treatment 18 inches, but it's less concerned about the fruit and vegetable treatment. this suggests that the fruit and vegetable treatment may be more effective in promoting the height growth of tomato plant. Fruit and vegetable waste compost is an effective source of nitrogen and potassium, providing essential nutrients for plant vegetative growth. They reported that crops grown with such compost showed higher biomass accumulation and improved stem height. Zeng et al., (2010).

Graph 1: Hight of Solanum Lycopersicon (Tomato)



This indicates that fruit and vegetables are more effective than the other two treatments, Green may have less nitrogen (N), phosphorus (P), potassium (K) or it decomposes slowly, or it lacks decomposition. Control group, without fertilizer, it has fewer leaves, which shows the importance of fertilizer for tomatoes or other crops. In other words, fruits and vegetables are more effective because they are rich sources of essential plant macronutrients (nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur), which help in plant development.

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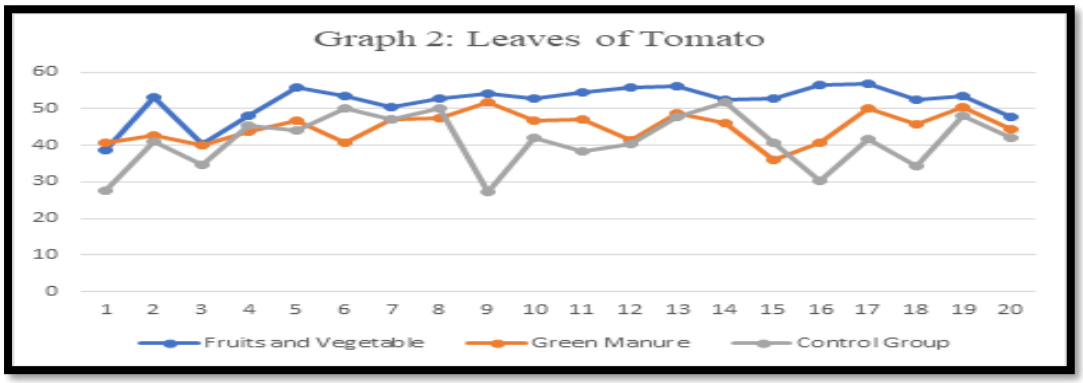
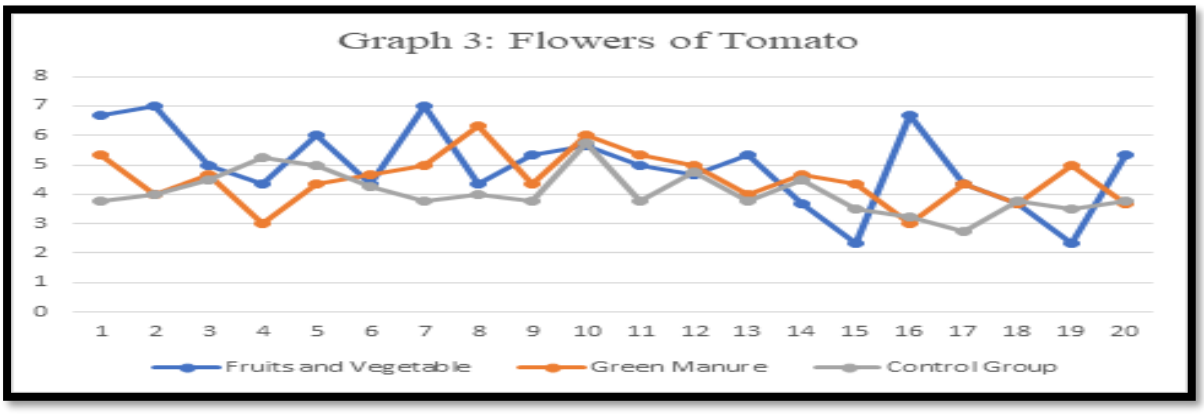
Graph 2: Leaves of Solanum Lycopersicon (Tomato)



In this graph, Fruit and vegetables are more prominent than the other two treatments; as you can see in the graph, they produce more than the other two treatments. The unit is also different; it may be affected by the changing weather, especially during the rainy season. We know that tomatoes are vulnerable to strong winds or storms, so their flowering was affected. Green manure: we can see in the graph that it is second in the two treatments. It may be that the nutrients it gets from the green manure we used are weak because of the past rains; its nutrients may have been lost because the water has taken the nutrients from the soil, so it was affected in flowering. The control group did not have manure; this may be one of the reasons why it has a weak or low chance of flowering, and also because of the changing weather. In short, fruit and vegetables are more dominant among them, green manure is second, and the last is the control group. This may be due to the combination of organic fertilizers, which, through mineralization, release sufficient amounts of nitrogen (N), phosphorus (P), potassium (K), and various micronutrients. This provides more comprehensive support for vigorous plant growth and flowering compared to other organic sources. Bal et al., (2006) conducted an experiment showing that the application of organic fertilizers resulted in earlier flowering of tomato plants.

Graph 3: Flowers of Solanum Lycopersicon (Tomato)



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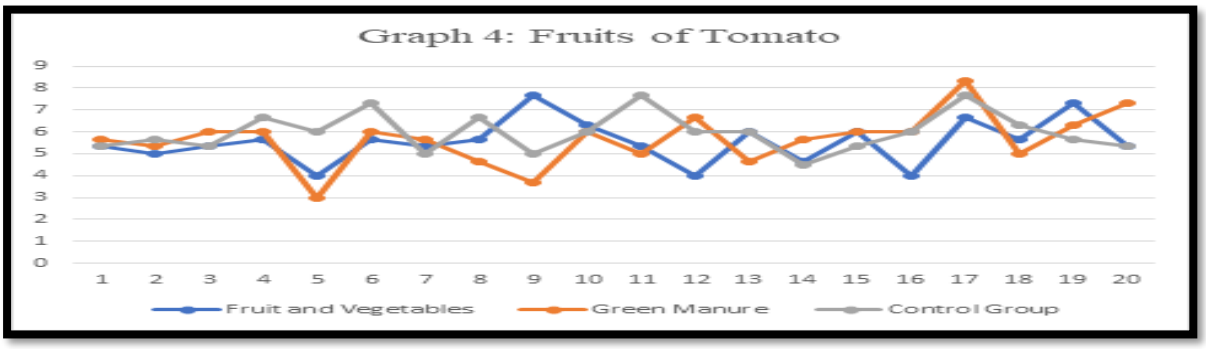
The graph shows that green manure is more dominant than the two treatments; its unit is also different some are lower, some are in the middle, or almost in the middle. Fruit and vegetable, here the reason its unit decreased is also because of the pests that destroy its fruits; we have seen many that are wasted due to insects and diseases. Control group, we wonder why it produced fruit and we had a harvest. Maybe because when it rains, the water flows to the area of tomatoes that do not have manure, and there the water that it brings from the two treatments accumulates. This shows that there are different methods of plant development, it has different nutrients, and maybe it is different in the release of nutrition into the soil. These microbes utilize the highly complicated substances of the compost and discharge vital nutrients into the soil, making them easily accessible for crops, increasing yield, and providing healthy foods to humanity (Meena et al., 2019).

Graph 4: Fruit of Solanum Lycopersicon (Tomato)



The statistical analysis indicates that the usage of fruit and vegetable waste significantly impacts the certain growth parameters when compared to the control group, especially the production of leaves and flowers (p=0. 01). Nutrient profile of fruit and vegetable amendments, therefore, seems to be very effective in promoting vegetative growth and flower initiation. However, the significance did not extend plant height or fruit yield (p+0. 05), therefore, these parameters might be inherently stable or influenced by factors other than the organic treatments. Surprisingly, the control group and green manure, or green manure and fruit and vegetable treatment, had no statistically significant differences in any characteristic, although the latter comparison showed slight trends in the number of leaves and flowers (p=0. 09). Essentially, fruit and vegetable waste, which is effective in foliage and floral development, its influence on plant height and fruit production is basically statistically the same as both the control and green manure treatments, according to the current experiment set, up. Exceed 0. 05, indicating no statistically significant differences. Overall, significant treatment effects are mainly observed in plant height, particularly between the fruit and vegetable treatment and the control group,

Table 1. Significant difference between the fruit and vegetable manure, green manure, and

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control group in the tomato growth production

	P-value			
Treatment	**Height**	**Leaves**	**Flowers**	**Fruits**
Fruit and Vegetable vs Control Group	0.69	0.01*	0.01*	0.46
Control Group vs Green Manure	0.63	0.79	0.34	0.11
Green Manure vs Fruits and Vegetable	0.15	0.09	0.09	0.39

*Significant

Description on Soil preparation, Planting maintenance, and Reproductive Success

Theme 1: Land and Crop Preparation

Soil preparation is essential for good crop growth. By cleaning the area, removing weeds, applying or adding fertilizer, measuring the area, and planting correctly, Soil and Crop Preparation help plants grow healthily and vigorously. Research continues to emphasize that careful soil preparation, which includes effective weed control and pre-plant nutrient application (fertilization), forms an essential foundation for maximizing germination, ensuring proper root development, and ultimately protecting the crop's yield potential.

Theme 2: Monitoring and Diagnostics

Monitoring and checking the plants are very important to keep them healthy. By taking care of the crops, adding fertilizer, observing their growth, cleaning the area, and removing weeds, Monitoring can find problems early and fix them. When these steps are done regularly, the plants grow well and the harvest becomes more successful. This understanding aligns with core agronomic principles that identify consistent post-planting maintenance as essential for mitigating stress, controlling resource competition, and maximizing yield potential. The regular performance of tasks like nutrient supplementation (fertilizing) and competition control (weeding) is particularly crucial, as timely intervention based on careful growth observation is scientifically proven to secure the highest quality and quantity of harvested produce.

Theme 3: Maximizing Reproductive Success

Maximizing reproductive success is achieved through proactive management and timely intervention. Fruiting success is directly dependent on plant health, as confirmed during Growth Observation, and the proper initiation of Flowering. Furthermore, consistent Weeding and Clearing practices serve as the foundation of success, ensuring that no valuable resources are diverted away from critical, yield-producing stages. This holistic perspective, which links continuous maintenance (weeding/clearing) directly to reproductive success (flowering and fruiting), is a cornerstone of

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modern agricultural science.

Theme 4: Production Management

The growth phase is a successive process where the success achieved during the later stages is not dependent on the hard work done during the early stages. Observation translates to Maintenance, which further provides for optimum performance during the Production phase, finally achieving a successful harvest. This is a complete system alignment for the systems approach promoted under agronomic principles where all stages of crop management, from the planning/observing stage to the harvest stage, are interrelated. It has been confirmed that working hard during the early stages involving activities such as Observation (data collection) and Maintenance is directly related to the plant's effectiveness in resource allocation for the stages that directly contribute to the harvest.

DISCUSSION

The test result showed that the compost of fruit and vegetable waste had a very positive impact on both the vegetative and reproductive growth of Solanum lycopersicum. The results of this treatment were always better than those of the green manure and control groups, mainly because of the presence of very important macronutrients, such as nitrogen, phosphorus, and potassium, in the compost. The fluctuations in plant height and fruit quality were partly due to environmental factors like heavy rainfall and pest attacks, but the fruit and vegetable amendment surely introduced ample and accessible nutrients for the plant development and flowering. The findings imply that although plant height and yield continued to be statistically equal among the groups, the organic supplementation mainly enhanced the distribution of the plant's internal resources for the development of the vegetative parts and the reproductive organs at an early stage.

CONCLUSION

Generally, the application of organic fertilizers, especially the fruit and vegetable wastes, is an extremely powerful method for tomato plant growth as compared to green manure or no treatment at all. The paper illustrates that regular soil preparation, care and nutrient supply are the major plant strength factors which can allow plants to withstand environmental conditions such as weather changes and pest attacks. There was a statistically significant difference between the control and treatment groups in leaf and flower production ($p=0.01$) but not in the final yield ($p > 0.05$), however, the overall trend is that organic amendments result in a healthier growth cycle. At last, linking production at early, mid, and late stages through observation and management can be called an integrated management system, which definitely leads to a successful and high, quality harvest.

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