

RESPONSE OF TWO VARIETIES OF PECHAY (*Brassica rapa*) APPLIED WITH DIFFERENT LEVELS OF FERMENTED PLANT JUICE

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ABSTRACT

This study is an experiment which was conducted from November 2021 to January 2022 at Brgy. Calangay, Santa Maria, Laguna to evaluate the different levels of Fermented Plant Juice (FPJ) on the growth and yield performance of different varieties of pechay in terms of weekly height of the plant, length of leaves, width of leaves, number of leaves, biological yield, economical yield, shoot root ratio, and cost and return. The study laid out in Randomized Complete Block Design (RCBD) to determine the response of different varieties of pechay (*Brassica rapa*) applied with different levels of Fermented Plant Juice (FPJ). It is a 2 x 5 factorial experiment with the varieties of Pechay as factor A (Pavo and Pavito), and the level of the Fermented Plant Juice (FPJ) as level factor B (control, 15ml, 22.5ml, 30ml, and 37ml, of FPJ/L of water).

The experimental treatments were replicated 4 times. The collected data were analyzed with the use of the Statistical Tool for Agriculture Research (STAR) and significant results were subjected to statistical analysis using Least Significant Difference (LSD) Test. The results showed that growth characteristics such as length of leaves, average number of pechay leaves, average width of pechay leaf, biological yield, economic yield, shoot root ratio, and cost and return show significant effects in terms of the FPJ level. Using 37.5ml. of FPJ/litter of water as level of treatment for pechay has significant effect on the growth and yield performance of pechay Pavo. The study recommends the use of 37.5ml. of FPJ/L. of water as level of the FPJ for better results.

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KEYWORDS – Brassica, Fermented plant juice, Levels of fermented plant juice, Pechay.

INTRODUCTION

Pechay (*Brassica rapa*) is major vegetable crop rich in vitamin C and contains significant amounts of nitrogen compounds known as indoles, as well as fiber—both of which appear to lower the risk of various forms of cancer. It has been selectively cultivated to produce a plant that has an exceptionally short life cycle of 30-45 days (Acero, 2013).

Present farmers of limited area preferably those that are in the upland always decided to earn their income for living through vegetable gardening. Take the case of some organic farms in Santa Maria, Laguna, most of them grown high valued vegetables like Pechay. Pechay is a shallow – rooted plant which grows in a loosely high fertile, well-drained soil, friable and rich in organic matter.

Pechay (*Brassica rapa*) belongs to the Brassicaceae family and one of the most known vegetables in the Philippines. It is also known as one of the oldest green vegetables in Asia. It therefore plays an important role in the Philippine economy as well as in the nutrition of the Filipino people. Pechay is used mainly for its immature, but fully expanded tender leaves. The succulent petioles are often the preferred part. It is used as main ingredient for soup and stir-fried dishes. In Chinese cuisine, its green petioles and leaves are also used as garnish. As the world population is rapidly increasing, food security became the world’s greatest challenge (Amtmann et al, 2008; Weidmann et al., n.d.). To meet the demand, chemicals are inevitably used to increase crop productivity (Rivera, 2004). However, when concern on soil and water pollution, food quality and safety, socioeconomic conditions (Landicho et al, 2014) and health and lifestyle are considered (Porciuncula et al., 2014; Shimoguchi & Mojica, 2016), organic agriculture presents an alternative agriculture system.

This worldwide shift increased the demand for organically grown crops (Porciuncula et al. 2014; Rivera, 2004). In the Philippines, organic farming has been practiced even before the promulgation of the Philippine Organic Agriculture Act of 2010 (Landicho et al, 2014). Organic fertilizers like fermented and decomposed organic materials have been used in many organic farms (Rivera, 2004).

At the present, there are notable source of organic matter which are highly recommended for

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crop production because of their nutrients contents which ensures good field to crops especially vegetable crops. Hence, this study will conduct to determine the response of different varieties of pechay (*Brassica rapa*) applied with different levels of fermented plant juice (FPJ).

OBJECTIVES OF THE STUDY

Generally, this study was conducted to evaluate the efficacy of different levels of fermented plant juice on growth and yield of two varieties of Pechay.

MATERIALS AND METHODS

Research Design

The study was laid out in Randomized Complete Block Design to determine the response of different varieties of pechay (*Brassica rapa*) applied with different levels of Fermented Plant Juice (FPJ). It is a 2 x 5 factorial experiment with the varieties of Pechay as factor A (Pavo and Pavito), and the level of the Fermented Plant Juice (FPJ) as level factor B (control, 15 ml, 22.5 ml, 30 ml, and 37.5 ml, of FPJ/litter of water).

Collection of Soil Sample

Soil analysis was done prior to planting to determine the required level of fertilizer to be applied. Soil samples were taken before land preparation from a depth of 0 to 30 cm. The soil samples were collected from randomly selected spots of the experimental area and were thoroughly mixed then dried to prepare a homogeneous sample.

The soil sample was air dried, pulverized, and mixed. One kilogram of the composite soil was brought to the Office of the Provincial Agriculturist Laguna Soil Laboratory (OPAg). The composite soil sample was used to determine the pH, nitrogen (N), phosphorus (P), potassium (K) contents of the soil using corresponding analytical procedure.

Preparation of experimental area

The experiment was conducted at Brgy. Calangay, Santa Maria, Laguna. The area was prepared a week prior to transplanting. A well-prepared field control weeds, recycle plant nutrients and provides a soft soil mass for transplanting. Land preparation covers a wide range of practices

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from zero-tillage or minimum tillage which minimizes soil disturbance through a totally puddle soil which actually destroys soil structure. It typically involves ploughing to till or dig-up, mix and overturn the soil, harrowing the break the soil clods into smaller mass and incorporate plant residue and levelling the field.

Seed Sowing

The soil medium was composed of garden soil, vermicast, and carbonized rice hull in a ratio of 1:1:1, were sterilized prior to seed sowing. Two pechay seeds were sown in each hole of the seedling tray.

Transplanting

Fourteen-day old Pechay seedlings were transplanted in the plot late in the afternoon at a distance of 30 cm. between hills and between rows. The seedlings were taken out of the seedling tray by pushing the bottom of the tray inward. The plots were watered immediately after transplanting.

Watering

Watering was done right after transplanting and was sustained until harvest. It was also done late in the afternoon.

Weeding and Cultivation

Hilling up was done a week after planting. Spot weeding was done by hand pulling to prevent weeds from competing with pechay plants for nutrients, water, light and space.

Pest and Disease Management

Regular monitoring of the experimental area was done to check for the incidence of insect pests and diseases. Insects that were observed on the plants from seedling to transplanting until harvesting were identified and recorded.

Preparation of Treatments

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All the treatments that were used in this study were prepared by the researcher. The Fermented Plant Juice (FPJ) was collected for the fermentation. FPJ 1.) gabi, banana stalks and kangkong were collected early in the morning while they are fresh and the microorganisms are still present. 2) The plants were cut out into small pieces so that the juice could easily be extracted. 3) Chopped plants were put in a container. 1kg of molasses was added and then mixed thoroughly by hands. 4) A sheet of paper was used to cover the opening of the container, and then secured it in place with a rubber band. The container was set in a cool and dark place. 5) After one week, look for a brown liquid at the bottom of the container. If liquid exists, the chopped plants have fermented. 6) Some of the liquid from the bottom of the container was removed by separating the liquid from the solid matter with a strainer over a bowl.

APPLICATION OF TREATMENTS

Treatments were applied using foliar spray during the seeding stage and as a foliar spray during the vegetative stage. The application started right after transplanting until it is ready to harvest and its frequency of twice a week. It was done late in the afternoon according to the schedule of treatment application.

Table 1. Schedule of application of treatments

Time of Application	Rate of Application	Methods of Application
14 days after sowing	2.5L/plot	Foliar
21 days after sowing	3.5L/plot	Foliar
28 days after sowing	4.5L/plot	Foliar
35 days after sowing	5.5L/plot	Foliar

Harvesting

Harvesting of the plants was done on the 35th day after sowing. Harvesting was done early in the morning and late in the afternoon.

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Data Collection Procedure

Weekly Plant Height. The weekly height of the plant was measured from the surface of the ground up to the tip of the tallest leaf of the plant. The researcher made an adjustment if the longest leaf’s tip was damaged.

Length of the leaves. The longest leaf was laid down on a table to measure its length. The leaf was measured from the base of the petiole to the tip of the longest leaf. The researcher made an adjustment if the longest leaf’s tip was damaged. It was done after harvest.

Number of leaves. The total number of leaves of each plant was counted after harvest. It includes even the smallest leaves that are late grower. It was done after the harvest.

Width of leaves. The widest leaf was laid down on a table and was measured its width after harvest.

Biological yield. It was gathered by weighing the whole plant with root after harvest.

Economical yield. The economical yield was gathered by weighing the individual plant without the roots. And it was done after harvesting the plants.

Shoot Root Ratio. This was computed by getting the quotient between the weights of the shoot weight of the root. Formula: $SHR = \frac{\text{fresh weight of shoot}}{\text{fresh weight of ratio}}$

Cost and Return. Cost in the study refers to expenses incurred in this study on pechay seeds and materials. It is the total cost incurred in this study. Return on investment refers to the return for every peso spent in the study.

Data Analysis

The collected data were analyzed with the use of the Statistical Tool for Agricultural Research (STAR) and significant results were subjected to statistical analysis using Least Significant Difference (LSD) Test.

RESULTS AND DISCUSSION

Weekly Plant Height

The weekly height of pechay applied with different levels of fermented plant juice. Highest measurement was obtained on the 4th week of the plant. Pechay treated with Pavo variety at 37.5ml. level of FPJ with the mean of 25. 2500 gave the highest height, followed by Pavito variety at 37.5ml. level of FPJ with the mean of 24.6500 while Pavito variety treated FPJ with control was the shortest with the mean of 20.6375.

Length of Leaves

The result of analysis on the length of different varieties of pechay applied with different levels of FPJ. The longest leaf (21. 875) was produced by Pavo pechay treated at the level of 37.5ml, while the shortest leaf was noted on Pavito variety treated control with the mean of 16. 225.

Based on the analysis for response of length of leaves, it was observed that based on the 0% level of significance, FPJ level with the Pr(>F) value of 0.0000 has highly significant on the length of leaves of Pechay. Based on the 0% level of significance, variety with the Pr(>F) value of 0.0023 has significant effect on the length of leaves. However, block and FPJ.Level: Variety has no significant effect on the length of leaves with the Pr (>F) value of 0. 1838 and 0.1193 respectively.

Number of Leaves

The effects of the treatments in terms of the number of leaves of different varieties of pechay applied with different levels of FPJ. Data Pavo variety with the level of 37.5ml and 30ml, and Pavo variety with the level of 37.50 obtained the highest number of leaves with 9. 50 followed by Pavito variety with the level of 30ml with 9.25 numbers of leaves.

Based on the analysis for response of length of leaves, it was observed that based on the 0% level of significance, FPJ level with the Pr(>F) value of 0.0004 was highly significant on the length of leaves of Pechay. Based on the 0% level of significance, variety with the Pr(>F) value of 0.0382 has significant effect on the length of leaves. However, block and FPJ.Level: Variety has no significant effect on the length of leaves with the Pr (>F) value of

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0. 7572 and 0.7486 respectively.

Width of the Leaves

The result of the analysis on the width of the leaves of different varieties of pechay applied with different levels of FPJ. Pavo variety treated 37.5ml significantly produced the widest leaves compared to those lower levels of FPJ, while Pavito variety treated control gave the least wide leaves.

Based on the analysis for response of width of leaves, it was observed that based on the 0% level of significance, FPJ.level with the Pr(>F) value of 0.0000 was highly significant on the width of leaves of pechay. However, block, variety and FPJ.Level:Variety have no significant effect on the width of leaves with the Pr(>F) value of 0.1599, 1.0000 and 0.2157 respectively.

According to Racoma et al (2017), the application of fermented plant juice gave the highest performance in terms of stem diameter and with interaction of variety and fertilizer in terms of weight of fruits per plants, computed yield per hectare. The researchers recommend the use of the fermented plant juice as is significantly affected the growth of pechay.

Biological Yield

Data showed that there is highly significant interaction effect in terms of FPJ level, variety, and FPJ level and variety with Pr(>F) value of 0.0000. Irrespective of the block, Pavo treated 37.5ml had significantly higher gain in biological yield with 138.0000 followed by Pavo treated 30ml with 134.7500 while the lowest was Pavito treated control with 122.2500.

Based on the analysis for response of biological yield of the plants, it was observed that based on the 0% level of significance, FPJ.level, Variety, FPJ.level:Variety with the Pr(>F) value of 0.0000 have highly significant on the biological yield of the plants. However, block has no significant effect on the biological yield of the plants with the Pr(>F) value of 0.4212.

Economic Yield

The roots and damaged leaves were removed to determine the economic yield of pechay.

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The result of analysis of the economic yield is presented in Table 7. It showed that Pavo variety treated at the level of 37.5 had the highest economic yield than those from Pavito variety.

Based on the analysis for response of economic yield of the plants, it was observed that based on the 0% level of significance, FPJ.level, Variety, FPJ.level:Variety with the Pr(>F) value of 0.0000 have highly significant on the economic yield of the plants. However, block has no significant effect on the economic yield of the plants with the Pr(>F) value of 0.7080.

Shoot Root Ratio

The result of the analysis on the shoot and root ratio of different varieties of pechay applied with different levels of FPJ is presented in table 8. A highly significant interaction effect of FPJ and the variety were observed. Pavo variety treated with 37.5ml gave the highest shoot root ratio. The lowest gain was observed in Pavito variety.

Based on the analysis for response of shoot root ratio, it was observed that based on the 0% level of significance, FPJ.level and variety, with the Pr(>F) value of 0.0004.

Cost and Return of Production

The cost and return of producing pechay using different levels of fermented plant juice was presented in table 9. The table showed that based on the analysis for the cost and return it was observed that based on the 0% level of significance, FPJ.level and variety, with the Pr(>F) value of 0.0000 has significant effect on the cost and return of production of the plants. However, block, variety and FPJ.level:variety have no significant effect on the cost and return of the production of the plants with the Pr(>F) value of 0.0138, 0.1812, and 0.946.

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

Based on the result of the study, it was therefore concluded that using 37.5ml/Litter of water as level as treatment for pechay has significant effect on the growth and yield performance of Pavo. However, block has no significant effect on the growth of pechay.

Based on the results of the study, the following are recommended: 1. Use higher levels of Fermented Plant Juice (FPJ) in pechay production 2. Result of this study may use as baseline data on a succeeding similar study. 3. Used for fermented plant juice (FPJ) vegetable production

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for health, nutrition, and low- cost inputs reason. 4. Replication of this study is recommended for vegetable production. 5. It is also recommended to use 37.5ml/l. of water as level of the FPJ for better results.

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