

# Bio-organic Fertilizer on Pechay Homegarden in Cotabato

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**Abstract:** This study focus on the determination of bio-organic fertilizer and levels of application that could gave favorable response on the growth and yield of pechay planted in a home garden at Arakan, Cotabato. Bio-organic farming is a key to sustainable agriculture leading to sustainable development. The bio-organic fertilizers used in this study include fermented plant and fruit juice (FPJ and FFJ). Result of the study revealed that FFJ responded significantly better as compared to FPJ on plant height, number of plant leaves and yield in grams per plant. In the case of the levels of application, higher application levels (6tbsp/lit. H<sub>2</sub>O) excelled on all parameters tested (plant height, number of plant leaves and yield). This implies that higher concentration of FPJ diluted on water will promotes better growth and development of pechay plant emphasizing development of the physical and biological properties of the soil.

**Keywords:** Bio-organic Fertilizer, Pechay, Fermented Plant Juice, Fermented Fruit Juice

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## 1. Introduction

Pechay (*Brassica pekinensis* L.) is one of the common leafy vegetable crops grown in the Philippines belonging to family cruciferae. Vegetables are important and substantial source of food that significantly contributes to the quality of our diet because it provides variety of nutrients. Various parts of enumerable kinds and vegetables make meals of staple food appetizing because of their flavor and even pleasing to the eyes. The major nutritional contributions of vegetables to the human diet are vitamins A and C as source of iron and calcium needed by the human body.

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 the marginal upland farmers in some selected barangay's of Arakan, Cotabato in Southern Philippines like Gambodis, Katipunan, San Miguel, and Napalico, most of them grown high valued vegetable crops particularly leafy vegetables like Pechay. The vegetable product were even brought to neighboring provinces such as; Bukidnon, Cagayan, Butuan, and even to Visayas Provinces as revealed by the vegetables farmers in the Bukidnon-Davao boundary (BUDA) area. Pechay is a shallow – rooted plant which grows in a loosely high fertile, well-drained soil, friable and rich in organic matter. At present there are notable source of organic matter which

contribute much to the attainment of higher level of organic fertility of the soil like farm manures which are highly recommended for crop production because of their nutrients contents which ensures good field to crops especially vegetable crops. Abbey *et al.* (2001) reported that animal and plant wastes at various stages of decomposition constitute soil organic manure. Soil organic manure come from dead plant roots, crops residues, green manure, dead soil microorganisms and farmyard manure (Abbey *et al.*, 2001).Dunn (1994) identified compost; plant materials (straw and dry leaves), garden waste and green manure as forms of organic manure that are commonly used by farmers to improve soil fertility. He further pointed out that green manure is derived from leguminous crops, which are grown as cover crops and ploughed into the soil.

A side from farm manures there are organic fertilizers such as Fermented Plant Juice (FPJ) and Ferment Fruit Juice (FFJ) which known to promotes growth and development of vegetable crops.

However, as to which kinds and levels of organic fertilizers is beneficial to pechay plants, vegetable growers still looking, thus, the researcher attempted to investigate the effect of these farm manures and fermented plants/fruit juice and its levels on pechay plant, one of the high valued vegetable crops in the country.

The result of this study may provide an appropriate cost

effective alternative production technology for the vegetable growers in the area and the region in general.

## 2. Materials and Method

### 2.1. Materials

The materials used in this study were Fermented Plant Juice (FPJ) and Fermented Fruit Juice (FFJ), Pechay seeds (*Brassica pekinensis*), seed box, garden soil as germination media, shoots of squash for FPJ and ripen banana (cardava) and mascovado for the FFJ.

### 2.2. Methods

The experiment used split – plot design with four treatments replicated three times.

Main plot (kinds of organic fertilizer)

Fermented Plant Juice

Fermented Fruit Juice

For Fermented Plant Juice (FPJ) and Fermented Fruit Juice (FFJ)

L<sub>0</sub> – control

L<sub>1</sub> – 2 tbsp/Lit.of water

L<sub>2</sub> – 4 tbsp/Lit.of water

L<sub>3</sub> – 6 tbsp/Lit.of water

Land preparation.the total area of 85sqm. was thoroughly prepared by flowing and harrowing three times with an interval of one week to properly decomposed organic matters and to have ease control of weeds and improved the soil texture of the area for favorable growth of the pechay plant.

Preparation of seed box and sowing of pechay seeds was done two weeks before transplanting. After one week of sowing, hand picking of germinant was done prior to transplanting.

The plot dimension was one point five (1x 1.5) meters with three furrows per plot. The planting distance was 30x30cm. to allow five plants per furrows to have 15 plants per plot.

### 2.3. Preparation of Fermented Plant Juiceand Fermented Fruit Juice

One kilo of squash shoots was chapped into small pieces until become fine. Mixed with one kilo of crude sugar or mascovado. Place in a clay jar and pert the rock on top for the contents to settle at the bottom.

On the next day removed the rock and cover the jar with a clean sheet of paper and tie with string. Put the jar in a cool and shaded place. The fermentation process were completed within seven days.

For the FFJ chop one kilo of ripe banana fruit (cardava) the chopped banana fruit was place inside the clay jar and mixed with one kilo crude sugar or mascovado. The jar was covered with clean sheet of paper (manila paper) and tie with string. The jar was stored in a cool and shaded area. Fermentation was lasted for seven days.

Application was done ten days after transplanting using the different levels or treatments/dosage of FPJ and FFJ which

was prescribed in the experiment using clean knapsack sprayer.

### 2.4. Care and Management

Watering was done every other day until 2 weeks after transplanting. After two weeks watering was done every three days after until 25 days after transplanting.

Weeding was done regularly to control needs and to maintain the cleanliness of the experiment.

Harvesting was done after 35 days of planting and was done by cutting the plants from the base.

## 3. Results and Discussion

### 3.1. Plant Height

Fermented fruit juice significantly produces taller pechay (22.5cm) compared to FPJ of 18.27cm. This result supported the findings of Juane C.G 2004 which states that applying fermented plant juice (FPJ) to vegetable crops will promote good plant growth and vitality. He further mentioned that mixing 1 tbsp per liter of natural water will have a very convening result on the plant growth and its vitality including the physical and biological properties of the soil for it increases the water holding capacity of the farm area.

Tamhean R.B et.al 1980 mentioned that organic fertilizer likes fermented fruit juice is a good source of plant nutrients to improve the physical properties of soils. They further states that application of organic fertilizer will improve the essential properties of the farm or the soil that are responsible for the vigor growth and development of the plants.

Parnes (1990), indicated that, both plant and animal sources of organic manure contain macro and micronutrients.

Among the levels of fermented plant/fruit juice applied, it was found out the 6 tbsp per liter of water significantly responded on plant height at 25.69cm (Table 1). According to Tamhean R.B et.al 1980, as you increased the level of application of fermented fruit juice diluted with natural water there was a corresponding increased of soil properties that are essential for growth and development.

**Table 1.** Plant height as affected by kinds and levels of organic fertilizer.

Levels of Organic Fertilizer	Mean Plant Height (cm)
FPJ	
Control	13.921
2 tbsp/lit H <sub>2</sub> O	18.38b
4 tbsp/lit H <sub>2</sub> O	20.17c
6 tbsp/lit H <sub>2</sub> O	20.60c
Mean	18.27a
FFJ	
Control	17.63a
2 tbsp/lit H <sub>2</sub> O	23.01b
4 tbsp/lit H <sub>2</sub> O	23.68b
6 tbsp/lit H <sub>2</sub> O	25.69c
Mean	22.50b

Means with same letter subscript are insignificantly different at 1%

### 3.2. Number of Leaves

Analysis of Variance reveals that fermented fruit juice promotes and develop more number of pechay leaves (12.79) as compared to FPJ of 7.32 (Table 2). This difference is highly significant implying that the later is better than FPJ

Of the three levels of application, it was found out that highest application of 6 tbsp per liter of water seems better in producing and developing pechay leaves (14.28). However, the three levels did not differ significantly in terms of number of leaves. IRRI 1990 mentioned that when levels of FFJ application increased it serves as an effective dilution to water which subsequently improved the growth and yield performance of leafy vegetables.

**Table 2.** Data on average number of leaves of Pechay applied with kinds and levels of organic fertilizers.

Levels of Organic Fertilizer	Mean No. of leaves
FPJ	
Control	5.84a
2 tbsp/lit H <sub>2</sub> O	7.20b
4 tbsp/lit H <sub>2</sub> O	7.67b
6 tbsp/lit H <sub>2</sub> O	8.57c
Mean	7.32a
FFJ	
Control	10.73a
2 tbsp/lit H <sub>2</sub> O	12.28ab
4 tbsp/lit H <sub>2</sub> O	13.88b
6 tbsp/lit H <sub>2</sub> O	14.28b
Mean	12.79b

Means with same letter subscript are insignificantly different at 1%

### 3.3. Yield

It reveals in the Analysis of Variance that fermented fruit juice still performing significantly better in terms of yield (161.55g/plant) as compared to FPJ of only an average of 77.93g/plant (Table 3).

**Table 3.** Yield of Pechay per plant applied with kinds and levels of organic fertilizers.

Levels of Organic Fertilizer	Mean weight
FPJ	
Control	56.85a
2 tbsp/lit H <sub>2</sub> O	66.27b
4 tbsp/lit H <sub>2</sub> O	69.48b
6 tbsp/lit H <sub>2</sub> O	77.93c
Mean	67.63a
FFJ	
Control	121.67a
2 tbsp/lit H <sub>2</sub> O	163.92b
4 tbsp/lit H <sub>2</sub> O	177.19c
6 tbsp/lit H <sub>2</sub> O	183.84d
Mean	161.55b

The three levels of application significantly differ its other. The highest application of 6 tbsp per liter of water gave the best result of 183.84g/plant followed by 177.19g/plant (4 tbsp/lit H<sub>2</sub>O) and the least was found with the control

treatment of no application (121.67g/plant). According to IRRI 1990, increased fermented fruit juice application serves as an effective dilution to water which subsequently improved the growth and yield performance of vegetable crops especially those leafy vegetables.

## 4. Conclusion

In terms of Fermented application it was concluded that as far as height is concerned, FFJ performed better compared with FPJ. This conclusion was similar to the findings of Juane, C.G (2004) when he said that application of FPJ to vegetable crops will give good plant growth and vitality.

However in terms of the number of leaves and weight of pechay it was concluded that FFJ showed better performance compared to FPJ. This conclusion is similar to the findings of Tagotong, M.M (2009) when he said that organic fertilizers like Fermented Fruit Juice (FFJ) is good source of plant nutrients to improve the physical properties of soil that were responsible for the vigor growth and development of plants. He further mentioned that when levels of FFJ application increased it was an effective dilution of water to improve the growth and yield performance of vegetable crops those leafy vegetables.

## Recommendations

1. Use the Fermented Fruit Juice in pechay production.
2. Result of this study maybe use as baseline data on a succeeding similar study.
3. Go for bio-organic vegetable production for health, nutrition and low cost inputs reason.

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