

## Application Of Nutrients In The Type Of Growing Media To The Yield Of Mustard Plants (*Brassica Juncea* L.) Hydroponically Wick System

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### Abstract

The Study Aimed to determine the effect of AB mix nutrient mixture with tofu pulp POC and type of growing media on the yield of mustard plants (*Brassica juncea* L.) hydroponically wick. This research was conducted from February to May 2023 in Kesiman Village, East Denpasar. This type of research is an experimental study using factorial Group Randomized Design (RAK) consisting of two factors. The first factor is a mixture of AB mix and liquid organic fertilizer (POC) which consists of 3 levels. The second factor is the type of media consisting of 3 levels. The first factor of AB Mix nutrition with tofu pulp POC consists of 3 levels, namely: (K1 AB mix + 20cc POC), K2 (AB mix + 30cc POC), (K3 AB mix + 40cc POC). Factors of both types of media consist of 3 levels, namely: M1 (rockwool), M2 (husk charcoal), M3 (cocopeat). So that 9 combination treatments were repeated 3 times so that there were 27 plants; Tofu pulp POC dose treatment + AB mix (K) and type of growing medium (M) had no real effect ( $P \geq 0.05$ ) on all observed variables. The absence of interaction indicates that the combined treatment of nutrients and media types has not been able to affect plant physiological processes. This study shows that the nutritional treatment of AB mix + 20cc POC tofu pulp with rockwool planting media. Shows the highest economic yield weight, namely 17.378 g and 17.711 g.

**Keywords:** ab mix, poc (tofu dregs), media type Plant.

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### 1. Introduction

Mustard plants are vegetable commodities that have commercial value and good prospects. This vegetable is a type of vegetable that is favored by all groups of society. The demand for mustard plants always increases along with the increasing population and awareness of nutritional needs. [1; 2]. Mustard plants are vegetable plants that are cultivated in sub-tropical climates, but are able to adapt well to tropical climates. Mustard greens are generally planted in the lowlands, but can also be in the highlands. Mustard greens are classified as plants that are tolerant of high temperatures (heat). The need for mustard greens is increasing along with the increase in human population and the benefits of consuming mustard greens for health. Mustard greens have high economic value after *crop* cabbage, flower cabbage and broccoli [3;4]. With advances in technology, the way of cultivating mustard plants is now no longer only done by using soil but can be done by applying a hydroponic system. The hydroponic system is planting plants without using soil media but using water that is given nutrients as nutrients or food sources for plants, Planting with a hydroponic system has various advantages including not requiring large land, easy to care for because the cultivation place is relatively clean and the planting media is sterile, protected from rain, pest and disease attacks are relatively small, more productivity, and has a high selling point [5;6]. In the hydroponic system, nutrients greatly affect the growth of mustard plants. Nutritional needs that are met for plants can make growth more optimal. In general, hydroponics requires complete nutrients and contains essential nutrients that consists of macro and micro. A common nutrient that is often used in hydroponic systems is AB Mix. AB mix has macro

nutrients namely Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), and Sulfur (S). As well as micronutrients, namely Iron (Fe), Manganese (Mn), Boron (B), Copper (Cu), Zinc (Zn) and Molybdenum (Mo) (Nugraha, 2014). NO<sub>3</sub> : 9.90 %, NH<sub>4</sub> : 0.48 %, P<sub>2</sub>O<sub>5</sub> : 4.83 % K<sub>2</sub>O : 16.50 %, MgO : 2.83 %, CaO : 11.48 %, SO<sub>3</sub> : 3.81 %, B : 0.013 %, Mn : 0.025 %, Zn : 0.015 %, Cu : 0.002 %, Mo : 0.003 % Fe : 0.037 % [6; 7] . Nutrients can be combined with liquid organic fertilizer (POC) so that nutrients in plants can be fulfilled, POC can increase crop production and maintain nutrient balance in the soil. POC is also good for the environment because it does not cause environmental pollution and provides soil microorganisms. Liquid organic fertilizer is a solution from the decay of organic materials derived from plant residues, animal waste, and humans whose nutrient content is more than one element [8]. . POC that can be used such as tofu pulp because the material is easy to find and comes from tofu making waste containing N, P, K, Ca, Mg, and C organics which have the potential to increase soil fertility. Based on the analysis, the dry matter of tofu pulp contains 2.69% water content, 27.09% crude protein, 22.85% crude fiber, 7.37% fat, 35.02% ash, 6.87% nitrogenless extract material (BETN), 0.5% calcium, and 0.2% phosphorus these contents have the potential to increase soil and plant fertility [9; 10]. In addition to nutrients and POC, planting media also has an important role in planting media needed because it functions as a place for root attachment, support for plants, and intermediaries for nutrient solutions [11]. Types of plant media that are good at hydroponics include, husk charcoal, rockwool, *sponge*, *fern stems*, *cotton*, *cork*, *krikil*, and cocopeat among the types of planting media above types of planting media that are common and often used in hydroponic systems, namely husk charcoal, cocopeat and rockwool [12; 13]. The purpose of this study was to determine the effect of AB mix nutrient mixture with tofu pulp POC and type of growing media on the yield of mustard plants (*Brassica juncea* L.) hydroponically wick .

## **2. Material and Methods**

The time and place of the research will be carried out from February to May 2023 in Kesiman Pentilan Village, East Denpasar, Denpasar City. The height is 20 meters above sea level, with a rainfall of 2,757 mm, the average temperature is 20-30°C. The tools used are net pots, books as a place to record scale data, measuring cups, wick system hydroponic tubs, netpot holes, TDS meters, flannel, toothpicks, stationery, measuring instruments, wood, plastic, nails, ropes, barrels or jerry cans buckets, and cameras. The materials used are mustard plant seeds, flannel wicks, water, EM4 starter, tofu pulp POC, AB mix nutrients, rockwool planting media, husk charcoal, and cocopeat.

This type of research is an experimental study using factorial Group Randomized Design (RAK) consisting of two factors. The first factor is a mixture of AB mix and liquid organic fertilizer (POC) which consists of 3 levels. The second factor is the type of media consisting of 3 levels. The first factor of AB Mix nutrition with tofu pulp POC consists of 3 levels, namely: (K1 AB mix + 20cc POC), K2 (AB mix + 30cc POC, (K3 AB mix + 40cc POC). Factors of both types of media consist of 3 levels, namely: M1 (rockwool), M2 (husk charcoal), M3 (cocopeat).

So that 9 combination treatments were repeated 3 times so that there were 27 plants.

The procedure for conducting research begins with the manufacture of liquid organic fertilizer (POC), tofu pulp and AB mix nutrients. The manufacturing process was carried out at the writer's house Br Denkayu Baleran, Werdhi Bhuawana Village, Mengwi District, Badung District. After that, proceed to make a simple greenhouse located at Jl. Sedap Malam, Kesiman, East Denpasar District, then preparation of wick system and hydroponic planting media. Tools are washed before use to avoid the threat of pests and plant diseases. The planting media to be used are rockwool, husk charcoal and cocopeat. Furthermore, seeding, is done by preparing the substrate in advance as a seedling medium. All growing media are weighed the same amount of weight. Next, rockwool is hollowed out using toothpicks, placed 1 mustard seed each into one hole and then watered using water. The transfer of mustard seeds into the netpot is

carried out when the plant seeds have 3 leaves, which are 2 weeks old or if the plants have met the transplant requirements, namely healthy and fresh plants, plant height and the number of leaves are relatively the same. Netpot is given flannel cloth as a wick and filled with planting media according to the nutritional treatment for each treatment is as follows: K1= (AB mix + POC 20cc), K2= (AB mix + POC 30cc), K3= (AB mix + POC 40cc). The nutrient solution is stirred every 2 days and the solution changes once a week because the best treatment is the time interval for POC administration at the level of once every 7 days. The change of nutrient solution and fertilization is carried out at 08.00 for 4 weeks then observe and maintain plants until the harvest period.

The way to determine the effect of the treatment given is to observe the variables, namely: plant height (cm), number of leaves (strands), fresh weight of economic results (g), dry weight of oven economic results (g), total fresh weight of plants (g), total oven dry weight (g), and harvest index (%)

All observational data that have been obtained are subsequently presented in tabular form. Data analysis is carried out using variance analysis (anava) The ANOVA test itself can be interpreted as one of the methods or hypothesis tests used in parametric statistics, where testing is carried out on the interaction of two factors by comparing the average of two or more samples. Until being able to determine the best treatment using the SPSS program.

### 3. Results and Discussion

#### 3.1 Result

Based on the results of statistical analysis of all variables observed in the presented study. The significance of the response or effect of giving AB mix with POC tofu pulp (K) and media type (M) and its interaction (KxM) on the observed variables showed no reality to all variables observed and measured.

Tabel 4.1 Significance of the influence of the type of growing media and nutrition ABmix + POC tofu pulp against all observed variables

No.	Variable	Perlakuan		
		Nutrition AB mix + POC tofu pulp (K)	Media type (M)	Interaction (KxM)
1.	Maximum plant height (cm)	ns	ns	ns
2.	Maximum number of leaves (strands)	ns	ns	ns
3.	Fresh weight of economical yield (g)	ns	ns	ns
4.	Oven dry weight economical yield (g)	ns	ns	ns
5.	Total fresh weight of the plant (g)	ns	ns	ns
6.	Total oven dry weight (g)	ns	ns	ns
7.	Harvest index (%)	ns	ns	ns

Keterangan : ns = Unreal influence ( $P \geq 0,05$ )  
 \*\* = Very real influence ( $P < 0,01$ )  
 \* = Real influence ( $P < 0,05$ )

#### 3.2 Discussion

Interaction between the dose of tofu pulp POC + AB mix with the type of growing media (KxM); Tofu pulp POC dose treatment + AB mix (K) and type of growing medium (M) had no real effect ( $P \geq 0.05$ ) on all observed variables. The absence of interaction indicates that the combined treatment of nutrients and media types has not been able to affect plant physiological processes. According to [14] the provision of nutrients can encourage plant growth in quantities that suit their needs. Too little or too

much will hinder growth. Factors that support the success of a hydroponic system are a porous medium and good aeration and sufficient nutrients for plant growth. Optimal production results can be achieved if growth factors are balanced and favorable. [15;16]

Judging from the POC analysis used, it shows that the availability of element N in POC is very low. Low N elements can affect the growth of mustard plants in line with the statement [17 ; 18] Nitrogen is needed to form important compounds such as chlorophyll, nucleic acids, and enzymes. These important compounds are needed in metabolic processes and stimulate growth processes. For this reason, nitrogen is needed in large quantities at every stage of plant growth, especially in vegetative growth stages such as bud formation or stem and leaf development. Without sufficient nitrogen supply, the increase in plant height is not optimal. If plants lack nitrogen then plants will experience slow and stunted growth [19]

For the types of planting media used such as rockwool, husk charcoal, and cocopeat have not shown a real difference in the growth and yield of mustard plants. The content of husk charcoal and cocopeat has not affected the difference in plant growth. Although the two treatment factors are not real for all variables observed, empirically from this study shows that the nutritional treatment of AB mix + 20cc POC tofu pulp with rockwool planting media. Shows the weight of economic results, namely the highest variable fresh weight of economic results, namely 17.378 grams and 17.711 grams.

The interaction between nutrient dose AB mix + POC tofu pulp with type of growing media (K×M), nutrient dose treatment AB mix + POC tofu pulp (K) and type of growing media (M) had no real effect ( $P \geq 0.05$ ) on all variables observed.

Treatment	Maximum Plant Height (cm)	Number Of Leaves (strands)	Fresh Weight of economical Yield (g)	Dry Weight oven economical result (g)	Total fresh weight of the plant (g)	Total Oven dry weight (g)	Harvest Index (%)
<b>Nutrient AB mix + POC (K)</b>							
K1 (AB Mix with POC 20cc)	27,444 a	8,000 a	17,378 a	1,289 a	22,967 a	1,689 a	76,989 a
K2 (AB Mix with POC 30cc)	27,400 a	7,444 a	15,933 a	1,322 a	23,078 a	1,722 a	77,268 a
K3 (AB Mix with POC 40cc)	27,300 a	7,889 a	16,011 a	1,356 a	24,578 a	1,833 a	74,838 a
BNT 0,05	-	-	-	-	-	-	-
<b>Media Type (M)</b>							
M1 (Rockwool)	27,844 a	8,000 a	17,711 a	1,344 a	23,544 a	1,833 a	74,191 a
M2 (Husk charcoal)	26,322 a	7,556 a	15,067 a	1,311 a	23,522 a	1,700 a	78,276 a
M3 (Cocopeat)	27,978 a	7,778 a	16,544 a	1,311 a	23,556 a	1,711 a	76,627 a
BNT 0,05 %	-	-	-	-	-	-	-

#### 4. Conclusion

1. The interaction between nutrient dose AB mix + POC tofu pulp with the type of growing media (K×M), nutrient dose treatment AB mix + POC tofu pulp (K) and type of planting media treatment (M) had no real effect ( $P \geq 0.05$ ) on all variables observed.
2. The nutritional dosing treatment of a mixture of AB + 20 POC tofu pulp gave the highest economic yield of fresh weight, weighing 17.378 grams.
3. This type of rockwool growing medium provides a fresh weight of economical results weighing 17.711 grams

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