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Feasibility Analysis of Pakcoy (*Brassica chinensis* L.) Cultivation with Hydroponic System Using Several Types of Planting Media

Sischa Febriani Yamesa Away[1*], Ririn Fatma Nanda[2], Kusmiati[1]

[1]Agribusiness Study Program, Faculty of Agriculture, Pasir Pengaraian University
[2]Agroindustrial Technology Study Program, Faculty of Engineering and Computer Science, Nadhlatul Ulama University

*Correspondence: E-mail: sischaaway@upp.ac.id

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ABSTRACT

Pakcoy is a leaf vegetable of high economic value and rich in nutritional content so it is greatly demanded by the public. This study aims to analyze the effect of using several types of planting media on the growth and yield of pakcoy plants with a hydroponic system; analyze the type of planting media that mostly affect the growth and yield of pakcoy plants; and analyze the feasibility of pakcoy cultivation with a hydroponic system using several types of planting media. This research was conducted from February to March 2021 in Kandang Lamo, Sarilamak, Harau Subdistrict, Lima Puluh Kota Regency, West Sumatra. Data were analyzed using a complete randomized design (CRD). There were three treatments using several types of planting media with three replications simultaneously covering a total of 81 plant samples. Data were analyzed with ANOVA, then continued with DMRT 15%. Financial economic analysis was measured by calculating revenue value, R/C ratio, BEP, and profitability ratio. The results reveal that the treatment of several types of planting media has not significantly affected the number of leaves and leaf's width, plant's height and plant's fresh weight. The highest average value is resulted by the brick fragments planting medium treatment. It is proven from the average results on the leaf's width (11.04 cm) and the number of leaves (17.03) at the age of 4 weeks after planting. The highest production yield value (131.24 gr) is resulted by the rockwool planting medium treatment. The results of the financial economic analysis show that the pakcoy cultivation business with a hydroponic system using various types of planting media is feasible to be continued. It is proven from the variable analysis of the business profit and loss statement on the parameter of R/C ratio and the profitability ratio.

1. Introduction

Pakcoy (*Brassica chinensis* L.) is one of the leaf vegetables that has high economic value. This plant can grow both in the highlands and lowlands. The production level of pakcoy vegetables in West Sumatra is generally still very low. According to data from the Central Bureau of Statistics of West Sumatra 2019 (West Sumatra CBS, 2019), pakcoy crop production in West Sumatra from 2018 to 2019 experienced a consecutive decline in productivity levels: from 85.10 quintals/ha (2018) to 80.21 quintals/ha (2019). One of the causes of the decline in the productivity level of pakcoy is the shrinking area of agricultural lands as many of them were converted into buildings and non-agricultural economic activities. To overcome this problem, various ways have been taken to increase plant productivity, with the hope that from a narrow land area, vegetables with high productivity can still be produced. One of these cultivation methods is the hydroponic system.

Hydroponic system is a solution to the problem of land farming, because hydroponic cultivation can be conducted through a verticulture method, namely plant cultivation arranged in a vertical or upward structure. This method aims to optimally utilize narrow and limited land. One form of hydroponic verticulture is using water flow with the Drip Flow Technique (DFT) system. The advantage of the DFT hydroponic system is that it is able to circulate the nutrient solution by turning on the water pump so that the temperature of the nutrient solution is keep maintained during the day and does not produce nutrient deposits in the container (Nurdin, 2017). Planting media is a determining factor in hydroponic cultivation because the planting media plays a role in storing nutrients and supporting plants' growth (Lingga, 2007). Planting media commonly used in hydroponic cultivation include sand, gravel, brick fragments, husk charcoal, rockwool, and so on. Rockwool planting medium is usually widely used in hydroponic cultivation because it is easier to use and has good nutrient absorption, but the price still tends to be expensive because it is quite difficult to obtain, especially in Lima Puluh Kota Regency. Therefore, an alternative planting medium that is easily obtained from local resources is needed. Lima Puluh Kota Regency is one of the production centers of rice and bricks, so there are many rice farmers who can produce rice husks and brick-making businesses that can be utilized as planting media. Based on this, the availability of local resources as an alternative planting media in hydroponic cultivation can be utilized without having to continuously rely on mainstream planting media to cultivate plants with hydroponic system.

Nowadays, hydroponic cultivation is not just a hobby, but has become a commercial method of cultivation. The tendency of cultivated plants using water or nutrient solution as the planting medium continues to grow from time to time. Inline with the increasingly narrow planting land in urban areas, many people are fell restricted to grow plants as they wish. Nonetheless, hydroponic cultivation can be done anywhere, and compatible with various media that can be utilized to produce a good harvested product. Many Indonesian farmers are starting to use this technique to grow their crops, and the market potential for hydroponics is still vast and can still grow in the future. The demand for hydroponic vegetables is increasing from time to time, coupled with the high price of vegetables. Therefore, the hydroponic business in Indonesia has become one of the highly promising business opportunities.

The development of pakcoy cultivation with hydroponic system has good prospects for supporting farmers' efforts to earn better income, community nutrition, and expanding employment opportunities. Financial business analysis is used as information to calculate the cost structure, analyze the level of profit, and measure the business feasibility to be conducted in the long run. Based on the these background, the purpose of this research is to analyze the effect of using several types of planting media on the growth of pakcoy plants with hydroponic systems, analyze the type of planting media that has the most effect on the growth and yield of pakcoy plants, and conduct a financial business analysis of pakcoy cultivation with hydroponic systems using several types of planting media.

2. Methods

This research was conducted from February to March 2021 in Kandang Lamo, Sarilamak, Harau Subdistrict, Lima Puluh Kota Regency, West Sumatra. Data were collected to obtain both primary data and secondary data. Primary data were obtained from observations of plants' growth and yield parameters. Secondary data were obtained from literature review (library research). The independent variable in this research was the types of planting media (rockwool, rice husk charcoal, brick fragments). Meanwhile, the dependent variables were the growth and yield of pakcoy plants. Not only that, analysis on technical financial and business feasibility was also carried out to see how feasible this cultivation business to be conducted by farmers.

This research used a Complete Randomized Design (CRD), conducted with three treatments, each of which with three replications. A number of 27 plants were prepared at each treatment. Thus, there were nine plants at each replication, and total amount of plants used in this method were 81 plants. The treatments consisted of planting media in the form of rockwool (M1), husk charcoal (M2), and brick fragments (M3). The tools used were netpot, flannel wick, DFT installation device, DC adapter pump, TDS meter, pH meter, measuring cup, measuring tape, and stationery. The materials used were pakcoy vegetable seeds, AB Mix plant nutrients, and the planting media, consisting of rockwool, husk charcoal, and brick fragments.

Data analysis was obtained from observations of pakcoy plants for 4 weeks after planting (WAP). Data were processed using Analysis of Variance (ANOVA), then continued with Duncan Multiple Range Test (DMRT) at 5%, all of which were tested using SPSS 20 software. Business analysis was carried out through calculating a number of parameters, namely total costs, total revenue, R/C ratio, break even point (BEP), revenue statement, and profitability ratio.

Revenue/Cost ratio (R/C ratio)

Revenue/Cost Ratio is the ratio between total revenue (TR) and total cost (TC) based on the following formula (Soekartawi, 2006).

$$\text{Revenue Cost Ratio (R/C)} = \frac{\text{TR}}{\text{TC}}$$

If the R/C ratio > 1, then the business is profitable or worth developing. If the R/C ratio < 1, then the business suffers a loss or is not worth developing. Furthermore, if the R/C ratio = 1, then the business condition reach the break even point.

Break even point (BEP)

Break even point (BEP) is an analysis to determine and figure out the amount of goods or services that must be sold to consumers at a certain price to cover the costs incurred and to make a profit. The following is the formula for calculating BEP (Soekartawi, 2006).

$$\text{Production BEP (kg)} = \frac{\text{Total cost (IDR)}}{\text{Selling price (IDR)}}$$

$$\text{Price BEP (IDR)} = \frac{\text{Total cost (IDR)}}{\text{Production price (IDR)}}$$

Business profit

Business profit is the subtraction of total revenue from the total business cost, which mathematically can be written as follows (Rahim & Hastuti, 2007):

π = TR - TC

Description:
π = Profit from business (IDR)
TR = Total revenue from business (IDR)
TC = Total cost of the business (IDR)

3. Results and Discussions

Determining whether or not a business is feasible must be seen from various aspects. An aspect is considered feasible if it meets certain standards. The feasibility analysis in this study focuses on the technical and financial aspects.

3.1 Technical feasibility analysis

The selection of an appropriate type of planting medium will positively affect the growth and production of plants, because the planting medium functions to provide nutrients and support plant's roots. A good planting medium is one that supports plant's growth and life. To successfully cultivate plants with hydroponic system, the planting medium generally should meet these criteria: porous, has good aeration, and has adequate composition of plant nutrients to support plant's growth.

3.1.1 Plant's height

The results of DMRT analysis displayed in Table 1 reveal that the treatment of several types of planting media has not significantly affected the plant's height at the observation age of 1- 4 WAP (weeks after planting).

Table 1. Average plant's height at the age of 4 WAP with several types of planting media treatment.

Treatments	Replication (cm)			Results
	1	2	3	
Rockwool	2.73	2.91	2.42	2.68 a
Husk charcoal	2.61	2.58	2.74	2.64 a
Brick fragments	2.21	2.42	2.45	2.38 a

Note: numbers accompanied by the same letter in the same column indicate no significant difference based on Duncan Multiple Range Test (DMRT) 5%.

Plants' height parameter shows the results that are not significantly different at the age of 1 to 4 WAP. At the age of 4 WAP, the highest average plants' height was generated by the treatment of rockwool planting medium treatment (M1) with a value of 2.68 cm, which not significantly different both from the husk charcoal treatment (M2) with a value of 2.64 cm, and from the brick fragments treatment (M3) with a value of 2.38 cm. Meanwhile, the lowest average plant's height was generated by the brick fragments planting medium treatment (M3), which not significantly different both from the rockwool treatment *(*M1) and from the husk charcoal treatment (M2). Therefore, observations of plant's height at 4 WAP showed that the planting medium with the highest value for the growth of plant's height was rockwool.

The ability of planting media to store nutrient solutions will affect the availability of nutrients in the media, meaning that low nutrient availability will inhibit the plant's growth itself (Wasinowati et al., 2013). The use of several types of planting media has its own advantages in supporting plant growth. According to Halim (2016), as a planting medium, rockwool has the ability to hold large amounts of water and air (oxygen for aeration), which are required for root growth and nutrient absorption. Husk charcoal is widely used as a planting medium due to its various advantages: it is easy to bind water, does not easily rot, is a source of potassium (K) needed by plants, contains a lot of silicon (Si) that can

improve soil acidity, and does not easily clump or compact so that plant's roots can grow perfectly. Brick fragments also can be used as an alternative planting medium, as well as other organic materials. The brick fragments medium functions to attach itself to the roots, so the size of the brick fragment to be used should be made small, such as gravel with a size of 2–3 cm. The smaller the size, the better the ability of bricks to absorp water and nutrients (Yudhistira & Aprilio, 2011).

3.1.2 Leaf's width

Table 2 displays the results of DMRT analysis of leaf's width parameter at the observation age of 4 WAP with several types of planting media treatment.

Table 2. Average leaf's width at the age of 4 WAP with several types of planting media treatment.

Treatments	Replication (cm)			Results
	1	2	3	
Rockwool	11.5	10.1	10.5	10.74 a
Husk charcoal	10.9	10	10.22	9.34 a
Brick fragments	11.56	10.77	11.1	11.04 a

Note: numbers accompanied by the same letter in the same column, indicate no significant difference based on Duncan Multiple Range Test (DMRT) 5%.

Leaf's width parameter shows the results that are not significantly different at the age of 1 to 4 WAP. The results of observations at the age of 4 WAP reveal that the highest average value of leaf's width was generated by the brick fragments planting medium treatment (M3) with a value of 11.04 cm, which not significantly different both from the rockwool treatment *(*M1) with an average value of 10.47 cm, and from the husk charcoal treatment (M2) with a value of 9.34. The lowest average value of leaf's width was generated by the husk charcoal treatment (M2), which not significantly different from the rockwool (M1) and brick fragments (M3) treatments.

The observation parameter of leaf area shows the amount of assimilate stored and produced by plants. The larger the leaf area, the more rapid a photosynthesis rate can occur, thus more assimilate products can be yielded by the plant. This is because the larger leaf area will make it easier for plants to capture more energy from sunlight so as to smoothen the photosynthesis process in order to facilitate the translocation of assimilate to plant organs that need it. The level of temperature, aeration, and humidity of the media will differ from one media to another according to the material used as media, thus affecting plant growth and yield. According to Bernardinus and Wiryanta (2002), the criteria for the appropriate planting media for hydroponics are being able to absorb and hold water, not easily rot, not affecting pH, sterile, free from pests and diseases, porous, lightweight, and does not contain toxins.

3.1.3 Number of leaves

Table 3 displays the results of the DMRT analysis of the number of leaves at the observation age of 4 WAP with several types of planting media treatment.

Table 3. Average number of leaves at the age of 4 WAP with several types of planting media treatment.

Treatments	Replication (strands)			Results
	1	2	3	
Rockwool	16.4	15.8	15.7	15.98 ab
Husk charcoal	16.11	14.88	14.66	15.22 a
Brick fragments	17.44	17.44	16.22	17.03 b

Note: numbers accompanied by the same letter in the same column, show no significant difference based on Duncan Multiple Range Test (DMRT) 5%.

The number of leaves parameter show significantly different results to the various types of planting media treatment at the age of observation 2 to 4 WAP. The results of observations at the age of 4 WAP show that the highest average number of leaves was generated by the brick fragments planting medium treatment (M3) with a value of 17.03, which significantly different both from the husk charcoal treatment (M2) with a value of 15.22 and from the rockwool treatment (M1) with a value of 15.98. The lowest average number of leaves was found in the husk charcoal treatment (M2), which significantly different from the rockwool and brick fragments treatment.

The brick fragments treatment (M3) generates the highest average value of the number of leaves, mainly because this medium can store water from the flow given to support the growth process of pakcoy plants, can absorp nutrients well, can maintain moisture, and can attach roots (Wagiman & Sitanggang, 2007). The level of temperature, aeration and humidity of the media will differ from one media to another according to the material used as media, thus affecting plant's growth and yield. Brick fragments have larger gaps and pores that can store more nutrients while maintaining the moisture of the root zone. This allows the leaf area with brick fragments medium to be high because of the many nutrients stored for photosynthesis.

The smaller the brick fragment's size, the better its ability to absorb water and nutrients. In addition, the smaller size of the brick fragments will also make the air circulation and humidity around the plant roots better (Evinola, 2019). Meanwhile, the husk charcoal treatment generates the lowest average number of leaves. This means husk charcoal medium is not considered favorable if we expect many leaves as a result. This is attributable by the characteristics of husk charcoal, namely has excellent properties in porosity and drainage, but very poor in absorbing and storing nutrients (Perwitasari et al., 2012).

3.1.4 Fresh weight

The following are the results of the DMRT analysis of the fresh weight parameter (gram) at the observation age of 4 WAP with the treatment of various types of planting media.

Table 4. Average fresh weight at the age of 4 WAP with various types of planting media.

Treatments	Replication (g)			Results
	1	2	3	
Rockwool	160.97	113.81	118.94	131.24 a
Husk charcoal	117.02	80.96	97.68	98.55 a
Brick fragments	117.68	107.69	112.2	112.52 a

Note: numbers accompanied by the same letter in the same column indicate no significant difference based on Duncan Multiple Range Test (DMRT) 5%.

The analysis on the parameter of total plant's fresh weight with several types of planting media treatment shows the results that are not significantly different among planting media treatment. The highest average plant's fresh weight was generated by the rockwool planting medium treatment (M1) with an average value of 131.24, which not significantly different both from the husk charcoal treatment (M2) with an average value of 98.55, and from brick fragments treatment (M3) with an average value of 112.52. The lowest average plant's fresh weight was generated by the husk charcoal treatment (M2), which not significantly different both from the rockwool (M1) and the brick fragments (M3) treatment.

The rockwool treatment produces a higher average value of fresh weight than other planting media. Presumably this is occurred because the sink and source parts of plants with rockwool planting media are heavier. Source is adult leaves and all plant tissues that capable to conduct photosynthesis, while sink are certain plant's parts that do not photosynthesize or photosynthesize but not optimally so that some of their carbohydrate needs are provided by the source. Sources include organs that are capable of producing excess photosynthate in addition to the organ itself, such as mature leaves that are capable to

fully conduct photosynthesis (More & Schopper, 1995; Taiz & Zeiger, 2003). Sink includes non-photosynthetic organs and organs that are unable to produce adequate photosynthate for the needs of the organ itself, for example young leaves that are not yet able to photosynthesize, roots, stems, seeds, flowers, fruits, and others (Wicaksono, 2011).

In leafy vegetables, the number of leaves will affect the plant's fresh weight. The greater the number of leaves, the higher the plants' fresh weight resulted. The plants' fresh weight includes stems and leaves, which are the organs to accumulate the photosynthate and are influenced by the availability of nutrients. Roots are part of the plant that cannot conduct photosynthesis, but the roots play a role in absorbing nutrients from the soil or medium and distributing them to plant organs so that they also affect the results of photosynthesis, which in turn will affect the fresh weight of pakcoy plants.

Nonetheless, this research shows slightly different results from the theory. The number of leaves and leaf's width are not a determining factor in the high yield of plant's total fresh weight. From the results of field observations and analysis, it is suspected that in rockwool medium, roots penetrate the planting medium faster and obtain nutrients intake directly from the flow of nutrients so that the weight of the rootstock of pakcoy plants with rockwool treatment is heavier than other media. On the contrary, husk charcoal and brick fragments planting media are slower in penetrating the planting media to obtain nutrients intake because during the transplanting process, the addition of planting media and media compaction were carried out so that the brick fragments and husk charcoal media are not carried away by the flow of nutrients, in this case by utilizing the capillarity system through the axis on the netpot in absorbing nutrients until the plant roots able to reach the surface of the nutrient flow. This is one of the factors that causes the roots' growth and development in the husk charcoal and brick fragments treatment tends to be slow to directly obtain nutrients intake (Hayati, 2010).

3.2 Financial feasibility analysis

Financial feasibility analysis is an aspect that needs to be considered to determine the sustainability of the business in the future by paying attention to the profits earned. This analysis on financial aspects have been investigated three reports, namely working capital investment, sales data of hydroponic pakcoy vegetables, and business feasibility.

3.2.1 Working capital investment

Table 5. Recapitulation of business costs of pakcoy vegetable cultivation with hydroponic system using several types of planting media.

Treatments	Material Cost (IDR)	Labor Cost (IDR)	Tool Depreciation Cost (IDR)	Overhead Cost (IDR)	Total Cost (IDR)
Rockwool	25,750	33,600	26,357	52,333	**138,041**
Husk charcoal	21,000	33,600	26,357	52,333	**133,291**
Brick fragments	21,500	33,600	26,357	52,333	**133,791**

Based on Table 5, it can be seen the amount of costs incurred in the pakcoy vegetable cultivation business with hydroponic system in one period. The highest total cost is resulted in the rockwool planting medium treatment with a total of IDR 138,041. The lowest total cost is resulted in the husk charcoal planting medium treatment with a total of IDR 133,291. The highest cost revealed in rockwool planting media is attributable to the rare availability of rockwool medium, which is still quite difficult to obtain in the research area. Therefore, it needs to be purchased from the outside of the area at a relatively high price with shipping costs are borne by the buyer.

3.2.2 Sales data of pakcoy vegetables cultivation with hydroponic system

Table 6. Sales data of pakcoy vegetables cultivation with hydroponic system.

Treatments	Weight (kg) (20,000)	Grade A (5,000)	Grade B (3,000)	Grade C (2,000)	Revenue (IDR)
Rockwool	8.69	2	5	1	200,800
Husk charcoal	8.4	1	5	2	192,000
Brick fragments	7.73	2	3	2	177,600
Total revenue					**570,400**

Based on Table 6, the highest total sales by weight and by grade is resulted by the rockwool planting medium treatment. Based on weight, it generates a value of 8.69 kg, resulting in a revenue of IDR 173,800.00. Based on grade, it generates 8 units, resulting in a revenue of IDR 27,000. Thus, total revenue generated from rockwool treatment is IDR 200,800.

3.2.3 Business feasibility

Table 7 shows that rockwool planting medium produced a total revenue of IDR 200,800. Total production costs amounted to IDR 138,041 so that the profit obtained in the rockwool planting medium treatment was IDR 62,759.

Table 7. Business feasibility analysis of pakcoy vegetable cultivation with hydroponic system.

Treatments	Revenue (IDR)	Total Cost (IDR)	Profit (IDR)	Profitability Ratio	R/C Ratio	Production BEP		Price BEP (IDR)	
						Weight (kg)	Grade (unit)	Weight	Grade
Rockwool	200,800	138,041	62,759	45%	1.45	6.90	5.38	15,885	17,255
Husk charcoal	192,000	133,291	58,709	44%	1.44	6.66	6.25	15,868	16,661
Brick fragments	177,600	133,791	43,809	33%	1.33	6.69	6.58	17,308	19,113

Profitability ratio is the level of a company's ability to generate profits by utilizing costs or working capital in it. Profitability ratio is calculated by dividing the total profit with the total cost. Table 7 shows that the highest level of profitability is generated in the rockwool planting medium treatment with a value of 45%. The profitability ratio level of 45% means that every IDR 1 of sales generates a profit of IDR 0.45.

R/C ratio analysis can be used to determine how far each value of money in the costs incurred can provide certain amount of revenue in return. Based on Table 7, the rockwool planting medium treatment generates the highest R/C ratio with a value of 1.45. Based on this result, the pakcoy cultivation using rockwool medium is considered feasible to be conducted because the R/C ratio is > 1. This means that every IDR 1 of cost incurred can generate revenues of IDR 1.45 and profits of IDR 0.45 or 45%. On the contrary, the lowest R/C ratio value is generated by the brick fragments treatment. This is because the amount of output produced is accompanied by a large enough amount of input, with a total revenue of IDR 177,600 and a total cost of IDR 133,791, thus resulting in an R/C ratio of 1.33, meaning the brick

fragments treatment is lower than the rockwool and husk charcoal treatments, which obtained R/C ratio of 1.45 and 1.44, respectively. Nonetheless, according to this result, conducting pakcoy cultivation business using brick fragments medium is still considered feasible.

Break even point (BEP) is the point at which the ongoing business does not experience profit or loss, namely total revenue (TR) = total cost (TC). Measurement of BEP was carried out on two indicators, namely price BEP and production BEP. The production BEP resulting from the sale of pakcoy vegetables based on the weight at the rockwool, husk charcoal, and brick fragments treatments were 6.9 kg, 6.66 kg, and 6.69 kg, respectively. This means that the business conducted with the treatment of rockwool, husk charcoal, and brick fragments will not experience profit or loss as long as it produces a minimum average output of 6.9 kg, 6.66 kg, and 6.69 kg respectively. In order to reach the break even on the BEP value of sales production based on the grade/size of each treatment, the minimum average output that must be produced are 5.38 units (rockwool), 6.25 units (husk charcoal), and 6.58 units (brick fragments).

The price BEP resulting from the sale of pakcoy vegetables based on the weight at the treatment of rockwool, husk charcoal, and brick fragments is IDR 15,885, IDR 15,868, and IDR 17,308, respectively. This means that the hydroponic pakcoy cultivation carried out with the rockwool, husk charcoal, and brick fragments planting media treatment will not experience profit or loss as long as the products are sold at a minimum average price of IDR 15,885, IDR 15,868, and IDR 17,308, respectively. In addition, in order to reach the price BEP value of sales based on the grade/size of each treatment, the products must be sold at a minimum average price of IDR 17,225 (for rockwool), IDR 16,661 (for husk charcoal), and IDR 19,113 (for brick fragments).

The use of different types of growing media provides different levels of profitability. Rockwool is a favorite planting medium used in hydroponic business due to its ease of use as a planting medium for leaf and fruit vegetables, but this medium can only be used for one production period. This is because at the first use, the rockwool structure has been penetrated and damaged by plant roots, thus make it difficult to be reused or recycled. On the other hand, husk charcoal and brick fragments are easily available by utilizing local wisdom. This makes both types of planting media can be used repeatedly for further production. Thus, husk charcoal and brick fragments can not only be utilized as an alternative planting media, but can also save costs for further vegetable production because there is no need to spend additional costs on planting media.

4. Conclusions

Based on the results and discussion of the analysis that has been described, the following conclusions are drawn. The treatment of several types of planting media has not significantly affected the number of leaves and leaf's width, the plant's height and plant's fresh weight. At the plant age of 4 WAP, the treatment that generates the highest average value is the brick fragments planting medium, as proven by the average results on the leaf's width with a value of 11.04 cm, and on the number of leaves with a value of 17.03. The treatment that generates the highest production yield value is the rockwool planting medium with a value of 131.24 gr. The business feasibility analysis results reveal that the pakcoy vegetable cultivation business with a hydroponic system using various types of planting media is considered feasible to be conducted in the long run. This is proven from the variable analysis of business profit and loss statements at the treatment of rockwool, husk charcoal, and brick fragments, which generates R/C ratio values of 1.45; 1.44; and 1.33, respectively and profitability ratio of 45%; 44%; and 33%, respectively.

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