

Business Analysis of “Syafa Farm” Water Spinach Hydroponic Farming in Rancaekek, Bandung Regency

Gita Sahira^{*}, Siti Mutia Septina and Samsul Arifin

Agribusiness study program, Faculty of Agriculture, Ma'soem University

**Corresponding author. Email: sahiragita2@gmail.com*

ABSTRACT

This research was conducted at Syafa Farm. This study aims (1) to understand how to cultivate water spinach using the hydroponic method, (2) to find out the income value of water spinach farming using the hydroponic method and (3) to understand the marketing of water spinach using the hydroponic method (4) to find the obstacles faced in the water spinach hydroponic business. The research location was chosen purposively with the consideration that in Syafa Farm, water spinach cultivated hydroponically.

The data in this study consisted of primary data, Primary data is an original and unique data, which is directly collected by the researcher from a source such as observations, surveys, questionnaires, case studies and interviews according to his requirements, while secondary data were obtained from agencies related to this study. This research uses descriptive method. The analysis used is the R/C analysis to determine the feasibility of the business. The results showed that the hydroponic cultivation technique of water spinach included initial preparation, seeding, planting, maintenance and harvesting. The income obtained from hydroponic water spinach farming is IDR. 300.00.

Keywords: *hydroponic water spinach, cultivation, income, marketing, constraints*

1. INTRODUCTION

Water spinach (*Ipomoea aquatica* Forssk.), family Convolvulaceae, is one of the most important vegetables in the tropics of South-East-Asia as well as in Japan, Australia and some regions of Africa [1]. Water spinach (*Ipomoea aquatica*) has been considered native to Africa, Asia, and the southwestern Pacific Islands. The herbs have been a medicinal vegetable in southern Asia since at least A.D. 300, and perhaps since 200 B.C [2].

With the later migration of people from Asian countries to other parts of the world, the food was imported into new areas. Doubt persists as to where the species was domesticated. Data from uses as food, regions of cultivation, medicinal use, phylogenetic studies, common names, and pathogens suggest that water spinach was first cultivated in southeastern Asia. The plants may have been domesticated in China and India, but the data are equivocal. The vegetable sometimes escapes from cultivation to become an ecologically invasive weed.

Indonesia is an agricultural country, most of the population living in the agricultural sector. Agriculture is an important sector for the survival of the Indonesian people because it is an important sector to meet human

needs for clothing and food. Increasing human population makes agricultural needs increase. The importance of awareness of the quality of food for health encourages the agricultural sector to produce quality output. There are several problems that arise, including the availability of less land, this is due to land conversion by humans. The productivity of agricultural products is demanded high, but with the dwindling availability of land, especially in cities, the Hydroponic system is an effective solution.

Hydroponics is a technique of growing plants in nutrient solutions with or without the use of an inert medium such as gravel, vermiculite, rockwool, peat moss, saw dust, coir dust, coconut fibre, etc [3].

to provide mechanical support [4]. A hydroponic system, or hydroponics, is a method of growing plants using mineral nutrient solutions in water without soil. For growing leafy vegetables in general, the main hydroponic systems used are the DFT and NFT systems. In the DFT system, nutrient solutions are supplied to the plants whenever the water level in the culture bed becomes lower than the set value, and are recirculated and supplied to the bare roots of plants, at constant time intervals, in

the culture bed with a 1/100 slope. NFT systems and modified DFT systems similar to an ebb-and-flow system have been widely used in plant factories [5]. Decreasing of land area causes conventional agricultural system become uncompetitive because of price of land is rising day after day. Hydroponic agriculture cultivation technology system provides an alternative way for farmers who have a narrow field or just have a yard to carry out agricultural business [6]. Hydroponics is also a solution for the community to maintain green land in overcoming city life which is starting to be polluted and the lack of cool air in the atmosphere of life in the city, and the narrowing of the availability of homesteads for agriculture plus it is one of the solutions for food security. According Purwanto (2005) [7], there are several hydroponic methods that all have the same preparation, namely the provision of media, seeds and nutrients (nutrients). Like other living things, plants cannot grow and develop if there is no input in the form of nutrients in the form of food or nutrients. Providing complete and regular nutrition can ensure perfect growth. Unlike conventional agriculture which uses soil as a planting medium, the hydroponic system can use a planting medium in the form of coconut husk or can use rockwool 154 which is commonly used in hydroponic systems. Coconut coir media can be used as well as rockwool for plant growth and some are used. Styrofoam as a planting medium.

Planting with hydroponic techniques can be used as a hobby and even learning to create your own green environment around the house. Hydroponic farming can open up opportunities for people to consume the vegetables and fruits they plant themselves. Hydroponics can also be used as a business to generate large profits or income.

According to Winardi (1992) [8], income is the result of money or other material results achieved from the use of wealth or human services. This amount of income can be used to assess the success of farmers in managing their farms. In the end, the success in farming will be determined by the costs incurred and the revenue earned in one growing season. Currently, there are still many people who cultivate crops using soil media, because for people farming uses. Hydroponics is expensive and requires training to gain sufficient knowledge to be successful in doing farming using hydroponic techniques [9]-[10].

There are residents of West Java, especially Bandung Regency, who have started to do agriculture with hydroponic techniques both as a hobby and for commercial purposes. One of the places that has carried out hydroponic techniques for commercial purposes is Syafa Farm, located in Bandung Regency, to plant hydroponic plants, namely water spinach (*Ipomoea aquatica*). The development of Syafa Farm Hydroponic farming is expected to increase household income. Therefore, it is necessary to study the amount of income obtained from Syafa Farm hydroponic farming.

From the description above, this research aims to:

1. Describe the hydroponic cultivation technique of water spinach
2. Calculating the income and profits of hydroponic water spinach farming
3. Describe the marketing in hydroponic water spinach farming
4. Describe the obstacles faced in the hydroponic water spinach business

The benefits of this research are as follows:

1. For Syafa Farm Hydroponics business owners, it is hoped that it can be a useful input to increase income in doing business.
2. For other research, it is hoped that this research can provide good benefits as material information about hydroponic farming income.
3. For the government, it can provide input to the local government (PEMDA), especially related agencies / agencies as a material for consideration to support and explore regional potential and determine policies to be carried out for the development and fostering of the agricultural sector based on hydroponics.

2. RESEARCH METHODOLOGY

Determination of the location is done Purposive (deliberately). This research was conducted in Bandung Regency by selecting one of the hydroponic vegetable businesses in Bandung as a case study. Based on the survey, the Syafa Farm Abdi Negara Rancaekek Housing business was chosen.

Data collection methods used in this study are through in-depth interviews and field observations. Secondary data were obtained from agencies related to the object of research and the results of literature studies. To answer the first objective of this study using a qualitative descriptive method, which describes the business description of hydroponic vegetables which includes aspects of hydroponic water spinach vegetable cultivation. To answer the second objective using quantitative descriptive methods, namely calculating the income and profits of the vegetable business at Syafa Farm.

The production costs in hydroponic farming consist of fixed costs and variable costs. To find out all the costs required, the following calculations can be used:

$$TC = FC + VC \quad (1)$$

Information:

TC = Total Cost (Total Cost)

FC = Fixed Cost (Fix Cost)

VC = Variable Cost

The revenue calculation can be formulated as follows:

$$TR = P \times Q \quad (2)$$

Information:

TR = Total business revenue (Total Revenue)

P = selling price (Price)

Q = Total Production (Quantity)

$$\text{Income} = TR - TC \quad (3)$$

Information:

TR = Receipt

TC = Total costs

Profit analysis in a business is the result of reducing production costs on the revenue received. In calculating profit, the following calculations can be used:

$$R / C = TR / TC \quad (4)$$

Information:

R / C = Profit (Profit)

TR = Total Revenue (Total Revenue)

TC = Total costs incurred (Total Cost)

To answer the third objective, a description is done by looking at marketing in hydroponic water spinach farming. To answer the fourth goal, a description is done by looking at the obstacles faced in hydroponic water spinach farming.

3. RESULTS AND DISCUSSION

Business Profile

Company Name	: Syafa Farm
Company Address	: Bandung Regency
Owner Name	: Ahmad Paoji H, S.Pd
Type of Business	: Hydroponic Garden
Year of Establishment	: 2018
Products observed	: Water Spinach

Mr. Paoji is an employee of the Al Ma'soem Foundation who has a hobby in agriculture such as Jhydroponics, so from his hobby of hydroponic plants, Pak Paoji founded Syafa Farm in Abdi Negara Housing. Mr. Paoji started a hydroponic business in 2018 with a capital of IDR 15,000,000 - in 2018. Mr. Paoji was assisted by his wife to create and manage a hydroponic garden. Ownership status of capital is own capital since its inception.

a. Technique of Cultivating Water spinach Plants by Hydroponics

Before starting how to plant hydroponic water spinach, first prepare the media and water spinach seeds first. The media needed include trays, husk charcoal, sponges, plastic pots, water pipes / basins and nutrients for water spinach plants.

b. Seeding

The seeds of water spinach are still in the form of granules and then sown on a seedling medium in the form of husk charcoal (dry roasted rice) The way to sow these water spinach seeds is by sprinkling the husk charcoal that has been placed and flattened on the tray. After the seeds are sown, then the seeding medium is covered with plastic for 2 days. In 2 days usually water spinach seeds will turn into sprouts. Even though they are in the form of sprouts, water spinach seeds are not transferred directly to the planting medium but must be placed in a place that has enough sunlight for 1 week, and wait for the water spinach seeds to be high enough.

c. Planting

The way to plant the next hydroponic water spinach is to move the water spinach seeds in the planting medium. However, to move the water spinach seeds to the planting medium, don't pull them out, but by dipping them in a basin filled with water along with the seeding media. Then shake the basin so that the seeds are separated from the seeding media. If they are separated and there are no lumpy seeds, then pinch the water spinach using a sponge. And after that, put the sponge with the water spinach in the pot. The pot that has become the growing medium for water spinach is then placed in a water pipe that contains AB mix nutrients. Try immersing water spinach roots in the nutrient solution of the water, because AB mix solution is the only nutrient that will be given.

d. Care

To care for water spinach itself is quite easy, A only needs to pay attention to the sufficient intensity of water spinach growth. And most importantly, keep the water spinach away from various pests and weeds.

e. Harvest

Harvesting can be done when the plants are around 21 to 30 days after the seedlings, harvesting is done by cutting or pulling up the roots, after that the roots of the water spinach are washed clean and remove damaged leaves. It should be noted that storage of these vegetables should be paid more attention

f. Income from Water spinach Farming

Based on the results of the research that has been done, it can be seen that the yield of hydroponic water spinach vegetables is 100 kg per month. For the selling price of hydroponic water spinach, this is generally almost the same as the price of hydroponic water spinach elsewhere, which is IDR 20,000 / kg. The costs incurred are the cost of vegetable seeds, the cost of external labour, flannelette, Rockwool, plastic, fuel oil, nutrition, electricity and water, stickers, receipts, stationery costs, land tax costs and

building, and equipment depreciation costs, so that the total production cost is IDR. 1,700,000.

The total revenue of hydroponic water spinach farming during the research was IDR 2,000,000. The income of hydroponic water spinach farming at the time of the research was IDR 300,000. The R / C ratio for hydroponic water spinach vegetables is 1,176. This means that the hydroponic water spinach vegetable business run by Syafa Farm as a whole is feasible to run and continue as a hydroponic vegetable business. Because every time you invest IDR. 1.00, then you will get a benefit or acceptance of IDR 0.176.

Table 1. Analysis of hydroponic water spinach farming per month

No	Variable	Amount
1	Production	100 kg
2	Price	IDR 20,000/ Kg
3	Production Cost	IDR 1,700,000
4	Revenue	IDR 2,000,000
5	Income	IDR 300,000
6	R/C	IDR 1,176

g. Water Spinach Marketing

The marketing process for Water spinach Hydroponic plant in Bandung Regency is carried out through a zero-level channel or direct marketing channel. Producer - Consumer. The main target is the need for vegetables in educational institutions and restaurants. Marketing is adjusted according to Receiving requests to consumers. The selling price of water spinach per 1 kg is sold at IDR 20,000 / kg. Transportation of the water spinach crop is carried out by motorcycle at 8 am water spinach begins to be delivered Receiving to consumers.

h. Hydroponic Water Spinach Farming Constraints

Running a business certainly cannot be separated from problems, there are various obstacles that must be faced. Constraints can arise from external factors or from internal factors. External factors that become obstacles, especially in hydroponic farming, are weather and climate change. The influence of weather on farming activities is quite high, very hot weather will cause plants to experience drought. Initially the plant will look withered, then dry and die. When entering the rainy season, farmers must be prepared because the rainy season will cause the pH of the water and nutrients to change rapidly, an unstable pH and nutrients that are not sufficient for the plant's needs can cause plants to turn yellow and then die. During the rainy season the plants are also easily attacked by fungi because the environment and plants are humid, fungi usually attack the leaves and roots of plants. Another obstacle is in terms of marketing, the marketing method used by the hydroponic system of water spinach farming is still not optimal. Farmers do marketing

according to the order. Farmers deliver orders to consumers themselves by using private vehicles. The limitation which is the factor causing the obstruction of the marketing process is due to the level of production. So that marketing is very limited, while the demand for this vegetable commodity is increasing day by day. This is because consumers are now starting to be careful and many have started to recognize the quality and quality of vegetable products produced by hydroponic planting systems.

4. CONCLUSION

Based on the results and discussion, the following conclusions are drawn:

1. The hydroponic cultivation technique of water spinach includes initial preparation, seeding, planting, maintenance and harvesting.
2. The income obtained from hydroponic water spinach farming is Rp. 300,000. With a value of R / C = 1.176, this means that hydroponic water spinach farming is not feasible to cultivate.
3. Marketing carried out in the hydroponic water spinach business is carried out by direct marketing in which producers directly send products according to consumer demand.
4. Constraints faced include weather and climate change as well as marketing.

REFERENCES

- [1] I. Pinker, U. Bubner, M. Böhme, Selection of water spinach (*Ipomoea aquatica* Forssk.)-genotypes for protected cultivation in temperate regions. International Conference on Indigenous Vegetables and Legumes. Prospectus for Fighting Poverty, Hunger and Malnutrition 752 (2006) 441-446. DOI: 10.17660/Acta Hortic.2007.752.80.
- [2] A. Endut, F. Lananan, S. H. Abdul Hamid, A. Jusoh, W. N. Wan Nik. Balancing of nutrient uptake by water spinach (*Ipomoea aquatica*) and mustard green (*Brassica juncea*) with nutrient production by African catfish (*Clarias gariepinus*) in scaling aquaponic recirculation system. Desalination and Water Treatment, 57 (60) (2016) 29531-29540. DOI: <https://doi.org/10.1080/19443994.2016.1184593>
- [3] N. Sharma, S. Acharya, K. Kumar, N. Singh, O. P. Chaurasia. Hydroponics as an advanced technique for vegetable production: An overview. Journal of Soil and Water Conservation, 17 (4) (2018) 364-371. DOI: <https://doi.org/10.5958/2455-7145.2018.00056.5>
- [4] Yuvaraj M, Subramanian K. S. Different Types of Hydroponics System. Biotica Research Today, 2 (8) (2020) 835-837.

[5] J. E. Son, H. J. Kim and T. I. Ahn, Hydroponic Systems. Department of Plant Science, Seoul National University, Seoul, South Korea Department of Biosystems Engineering, Seoul National University, Seoul, South Korea. Toyoki Kozai, Genhua Niu, Michiko Takagaki editors: Plant Factory, Burlington: Academic Press. 2016.

[6] P. Putera, S. A. Novita, M. I. Hamid and S. Syafii, Development and Evaluation of Solar-Powered Instrument for Hydroponic System in Limapuluh Kota, Indonesia. Development and Evaluation of Solar-Powered Instrument for Hydroponic System in Limapuluh Kota, Indonesia, 4 (5) (2014) 284-288.

[7] E. Purwanto, Pengaruh Konsentrasi Dan Frekuensi Pemberian Larutan Nutrisi Terhadap Pertumbuhan dan Hasil Selada (*Lactuca sativa*) Secara Hidroponik Fakultas Pertanian, Bachelor Degree, Universitas Muhammadiyah Jember, 2005.

[8] Winardi, Manajemen Perilaku Organisasi. Bandung: PT Citra Aditya Bakti, 1992.

[9] Martin M, Molin E. Environmental assessment of an urban vertical hydroponic farming system in Sweden. Sustainability, 11 (15) (2019) 4124. DOI: <https://doi.org/10.3390/su11154124>

[10] Gentry M. Local heat, local food: Integrating vertical hydroponic farming with district heating in Sweden. Energy, 174 (2019) 191-197. DOI: <https://doi.org/10.1016/j.energy.2019.02.119>