AGROLAND: The Agricultural Sciences Journal
Vol. 8, No. 2 December (2021), 99 - 107
P-ISSN : 2407- 7585 & E-ISSN : 2407- 7593, Published by Tadulako University

Original Research **Open Access**

ANALYSIS OF WATER SPINACH AGRIBUSINESS APPLICATION IN BORDER AREA OF REPUBLIC OF INDONESIA – DEMOCRATIC REPUBLIC OF TIMOR LESTE

(Case Study Of Napan Village North Bikomi Subdistrict North Central Timor Regency)

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Submit: 20 Januari 2021, Revised: 25 Agustus 2021, Accepted: December 2021
DOI : https://doi.org/10.22487/agroland.v0i0.621

ABSTRACT

This study aimed to find out the general description, analyze the level of application, and determine the income of the kale agribusiness in Napan Village. This research was conducted at the Bikiu Farmer Group, Napan Village, North Bikomi District. Data collection was carried out in August 2020. Sampling was carried out using a purposive sampling method, which only took all group members. The data collected in the form of primary and secondary data were then tabulated using income analysis and R/C ratio to determine the feasibility of water spinach farming. The results of the study concluded that the stages of water spinach farming activities with an area of 15 hectares with each group member entitled to 5 acres, with a total fixed cost of Rp. 2,509,374.5 or the average fixed cost incurred is Rp. 167.291.7 -/ha. The total variable costs incurred are Rp. 400,000, with an average variable cost of Rp. 26,666.67,-/ha, the total income obtained by farmers in water spinach cultivation activities is Rp. 36,294,625, - with an average income of Rp.1,960.2 00, with total income is Rp. 36,294,625, with an average income of Rp. 2,419,642., -/ha for one planting season. The feasibility of water spinach vegetable farming (R/C Ratio) obtained by farmers is 13.47. Water spinach farming is profitable, so it is feasible to continue.

Keywords*:* Water spinach, Income analysis, Agribusiness applications.

INTRODUCTION

The development of horticultural agribusiness, especially water spinach, is an integral part of agricultural activities, starting from the subsystem for the procurement of inputs for production facilities (input), cultivation (on-farm), processing, marketing, and supporting institutional subsystems in the form of

partnerships for farmers (Purnaningsih, 2007). Developing horticultural crop agribusiness with these activities makes it necessary to develop good agribusiness to achieve optimal and quality results.

Water spinach is one of the favorite vegetables in Nusa Tenggara Timur (NTT). Water spinach production in NTT in 2013, to 2015 were 5,057.90; 4,711.50; and 4,219 tons respectively (BPS NTT, 2019).

Timor Tengah Utara (TTU) is a regency where most farmers cultivate vegetables to meet their daily needs. Several previous studies illustrate that vegetable farming in TTU Regency is economically profitable for farmers. One vegetable that is widely cultivated in TTU Regency is water spinach. The consumption of water spinach and a source of vitamin A and minerals, and other nutritional elements that are useful for the health of the body can also function to calm nerves or efficacious as sleeping pills. The most important parts of the kale plant are young stems and shoots as vegetable ingredients. Empirical facts indicate that the level of water spinach consumption increases along with the increase in public knowledge and awareness of nutritious and affordable food by all economic circles (Satsijati et al., 1989; Rahman and Parkplan, 2004). The nutritional content in every 100 grams of kale contains energy: 29 kcal, protein: 3 g, fat: 0.3 g, carbohydrates: 5.4 g, calcium: 73 mg, phosphorus: 50 mg, iron: 3 mg, vitamin A: 630 IU, vitamin B1: 0.07 mg, vitamin C: 32 mg (Sofiari, 2016; Perdana, 2009)

According to the initial observations, the production of water spinach in TTU Regency in 2013-2016 was 112.1 tons, 81.8 tons, 71.1 tons, and 44.8 tons with an average land area of 1 Ha (BPS Kab. TTU, 2017). The data shows that there is a decline in production from year to year, even though the water spinach farming in TTU Regency is economically profitable, this occurs because the total land area of farmers who produce water spinach is 1 Ha, but the price continues to increase from Rp 3,250.00 to Rp 5,000.00 per bunch (450 grams), so it's no wonder if production is declining but economically profitable.

Napan Village is one of the villages located in the border area of two countries, Indonesian and Republic Democratic Timor-Leste (RDTL), North Bikomi District, TTU Regency, a center for vegetable production. One of them is water spinach. Its strategic location makes Napan Village very suitable for developing vegetable agribusiness where the vegetable production responds to the demands of local consumers and neighboring countries, namely RDTL through border markets and traditional markets located in Kefamenanu City.

The border market of Indonesia and Timor Leste is a cross-border free market with certain agreements by the two countries for the welfare of the border communities. This free market is held at the end of every month, with various products from Timor Leste and Indonesia, where the transaction does not escape the marketing of fresh vegetables such as kale which are traded to customers from Timor Leste or Indonesia.

Table 1. Water Spinach Production by Farmers Group in Napan Village, North Bikomi District, North Central Timor Regency

Year	Farmers Groups		
	Bi'kiu	Cinta Damai	Nunuh Naek
2014	950.5 Kg	300.35 Kg	300.45 Kg
2015	950.53 Kg	300.7 Kg	400.30 Kg
2016	950.82 Kg	300.10 Kg	450.5 Kg

Source: Napan Village, 2020

In line with the increasing economic level of the local community, water spinach commodity increase the level of vegetable demand. The limited water resources did not dampen the intention of vegetable farmers in Napan Village to continue horticultural farming. Napan village has three farmer groups, namely: Bikiu, Cinta Damai, and Nunuh Naek Farmers Groups. The Bikiu Farmers Group is engaged in horticultural agribusiness, Cinta Damai Farmers Group is engaged in forestry agribusiness, and Nunuh Naek Farmers Group is engaged in food agribusiness. These three farmer groups have been confirmed by the local authority of the Ministry of agriculture.

The Bi'kiu Farmer's Group was formed in 2008. This group consists of 20 people, who are still active since 2008 and have survived to this day. This group focuses on horticultural agribusiness. The commodities that are usually cultivated by this group are water spinach, eggplant, tomatoes, and paria (Peaceae). Among these commodities, which are usually cultivated in large quantities is water spinach. The water spinach vegetable business is considered by this group to be promising so that it is always cultivated by the Bi'kiu Farmer Group. This can be seen in the production results from 2013-2016, namely in 2013 as many as 1,800 bunches, 2014 as many as 1,910 bunches, 2015 as many as 1,956 bunches, and 2016 as many as 1,985 bunches. The selling price for each bundle is Rp. 5,000.00. Judging from the increase in water spinach production from 2013-2016, it is necessary to study and analyze the application of water spinach vegetable agribusiness in Napan Village as one of the country border areas.

MATERALS AND METHODS

The research was conducted at the Bikiu Farmer Group located in Napan Village, North Bikomi District, North Central Timor Regency from August to December 2020. The sample in this study was determined by purposive sampling which only took all members of the farmer group (20 people). The data was collected in the form of primary data and secondary data.

The data analysis method used in this research was descriptive qualitative analysis method, income analysis, and farming feasibility. Qualitative descriptive analysis method to analyze the description of water spinach vegetable farming and income analysis method to find out how much income was obtained from water spinach vegetable farming during one growing season. Soekartawi, (1995) in Manikin, M.G., & Joka, (2020), suggests that to identify the problem of the size of a business's income, it can be analyzed using the income level formula, namely:

$$\mathbf{Pd = TR - TC}$$

Where:
Pd = Income
TR = Total revenue
TC = Total cost

To find out whether it is feasible or not to farm water spinach in Napan Village, North Bikomi District, North Central Timor Regency, an analysis using the R/C ratio formula was used.

RESULTS AND DISCUSSION

General description

Water spinach (*Ipomoea reptans* Poir) is an annual plant that lives in tropical and subtropical areas. This plant belongs to the *Convolvulaceae* family with gummy stems and holes (Anggara, 2009). The public well knows water spinach as a green vegetable that contains high levels of vitamins and minerals at low prices and is easy to obtain, and its cultivation is also relatively easy. This character supports its development as one of the potential horticultural crop commodities (Alpian, 2013).

Napan Village is one of the villages located in the border area of the Republic of Indonesia-RDTL. North Bikomi Subdistrict, TTU Regency, is one center of vegetable production, one of which is

water spinach. The Biki'u Farmer Group is a farmer group located in Napan Village, North Bikomi Subdistrict, North Central Timor Regency, with 20 members. The Biki'u Farmers Group was formed in 2008 led by Mr. Yosef Abi, and inaugurated in 2011 which has been active since that year and continues to this day. This group focuses on horticultural agribusiness. The commodities usually cultivated by this group are kale, eggplant, tomatoes, and bitter gourd. Among these commodities, which are usually cultivated in large quantities, are kale. The farmer group considers the water spinachbusiness to be very supportive and fulfils the demands of Napan village so that the Biki Farmers Group 'u always produce kale.

Characteristics of respondents

Water spinach farmers have different ages so that as farmers age, their physical work also decreases. It can be seen that most of the water spinach farmers in the Biki'u Farmer Group have a productive age of 45-58 years.

Economically productive age is divided into three classifications: the age group of 0-14 years is not yet productive, the age group 15-64 years is the productive age group, and the age group above 65 years is the age group that is no longer productive. (Mantra, 2004).

Gender

Water spinach farmers in the Biki'u Farmer Group consist of men and women, as shown in Table 2.

Table 2. Gender of water spinach in Biki'u Farmer Group.

Gander	Number	Per cent (%)
Male	12	60,00
Female	8	40,00
Total	20	100

Source: Primer data after analysed, 2020.

Table 3. Education level of water spinach in Biki'u Farmer Group.

Education	Number	Per cent (%)
Elementary	11	55
Junior High School	1	5
Senior High School	7	35
Vocational High School	1	5
Total	20	100

Source: Primer data after analysed, 2020.

Based on the study results, it was found that the number of male farmers in the Biki'u farmer group were 12 people (60%) while the number of female farmers were 8 people (40%). It can be argued that there are more male farmers than female farmers in kangkung farming in the Biki'u Farmer Group.

Level of education

The level of education is a supporting factor for farmers in an area. The higher the farmer's education level, the easier it is for the farmer to accept the changes or new innovations he experiences, as shown in Table 3.

Following Table 3, it can be stated that the water spinach farmers in the Biki'u Farmer Group received education at the Elementary School level as many as 11 people (55.00%) followed by the Junior High School education level of 1 person (5, 00 %). In contrast, the education level of Senior High School are seven people (35.00%) and for the Vocational High

School level is one person (5.00 %). It can be seen that the water spinach farmers in the Bikiu farmer group in terms of education are pretty lacking, so farmers rely more on experience in farming kale vegetables so that they have the opportunity to have low technology adoption or are less able to innovate.

Experience

The experience of farming kale vegetables owned by the respondent farmers can affect the ability of farmers to master cultivation techniques in their farming activities.

It can be concluded that the kale vegetables in the Biki'u Farmer Group, Napan Village, who have 1-2 years experience are 14 people (70.00%) followed by three years are three people (15.00%) while those who have four years experience are three people (15.00 %).

Analysis of the application of Agribusiness on water spinach

Production facilities procurement subsystem

The subsystem of procurement and distribution of production facilities is also often referred to as upstream agribusiness, defined as activities that innovate, produce and distribute agricultural production facilities, industrial machine tools, fertilizers, seeds, and pest and disease control drugs (Saragih, 2001). Furthermore, according to the Bali Provincial Agricultural Department (2010) that upstream agribusiness includes industries that are Producing capital goods for the agricultural sector such as; seed industry, vegetables, livestock, fish, agrochemical industry, and agricultural machinery industry.

According to respondents at the farm's location, farmers get the means of production in their farming is relatively easy. Procurement of facilities such as seeds is obtained through direct assistance from the Field Facilitator (PPL), which is given directly to the group leader and then distributed to farmer group members. At the same time, fertilizers and pest control drugs, respondents use natural materials obtained in the surrounding environment, so that the application of the agribusiness system provides production facilities are pretty good, according to the research results of Harianti et al. (2020); Supristiwendi & Azizah, (2019).

Table 4. Experiences of water spinach farmers in the Biki'u Farmer Group.

Experience (year)	Number	Per cent (%)
1-2	14	70,00
3-4	3	15,00
>4	3	15,00
Total	20	100

Source: Primer data after analysed, 2020.

Production subsystem

Soekartawi (2003) defines farming as a science that studies how a person allocates existing resources effectively and efficiently to obtain high profits at a particular time. For a farmer, analysis income is a measure of the success of a managed farming, and this income is used to meet daily needs and can even be used as capital to expand the farm.

According to respondents, farming is relatively smooth, starting from nurseries, land preparation, planting, fertilizing, plant maintenance, and harvesting. Since the production of water spinach always meets demand, so the Biki'u Farmers Group plant more or produce kale without even using organic fertilizers (Jahi, Amri and Damihartini, 2005).

Post-Harvest and Processing Subsystem

Post-harvest and advanced processing subsystems can function to carry out

further processing at the primary, secondary and tertiary levels to reduce value losses or increase

Product quality to meet the needs and tastes of consumers and facilitate the marketing of the results through planning a sound marketing system (Suparta, 2005).

According to the respondents, the farmer groups carried out further processing of the kale by harvesting the kale by cutting the stems of the kale and then the water spinach, which was still dirty, or the remaining soil attached to the stems of the kale was cleaned and tied using a rope.

Marketing Subsystem

Marketing of agricultural products is an activity that aims to improve and develop the marketing activities of a product, taking into account the marketing channels that can be used to distribute products from producers to consumers. According to Kotler (2017), to reach the target market, marketers use three types of marketing channels, namely: (1) communication channels, namely conveying and receiving messages from advisers, these channels include newspapers, magazines, radio, television, letters, telephone, internet and Billboard; (2) distribution channels for deploying, selling or delivering physical products or services to customers or users; and (3) service channels for conducting transactions with prospective buyers; these channels include warehouses, transportation companies, banks and insurance companies that assist with transactions.

At the research location, the marketing activities carried out by the Biki'u Farmer Group are selling around the village every morning and evening on foot and selling kale vegetables at the RI-RDTL border market every market day once a month every Friday in the last week.

Supporting Institutional Subsystem

Supporting Institutional Subsystems include: (1) counseling; (2) research; (3) agribusiness information; (4) setting; (5) capital credit and (6) active and passive transportation function to provide services for the needs of agribusiness system actors to launch company activities and agribusiness systems (Suparta, 2005). The supporting service subsystem also supports pre-harvest and post-harvest activities, which include: (1) commercial administration facilities; (2) banking/credit; (3) agribusiness counseling; (4) farmer groups; (5) agribusiness infrastructure; (6) agribusiness supporting subsystem cooperatives; (7) BUMN; (8) private; (9) research and development; (10) education and training; (11) transportation and policy government (Hermawan, 2008).

At the research location, respondents received training held by the District Government of North Central Timor on cultivating horticultural crops, both theoretically and practically. The Biki'u Farmers Group had no difficulty cultivating horticultural crops such as kale, similar to the findings. Members of the Biki'u Farmer Group also provide group contributions as group savings collected every month in the amount of Rp. 5,000.00 as group cash

Analysis of water spinach income in the Biki'u farmer group in Napan Village

The land used by the Biki'u Farmer Group is loan land provided without providing service fees to the landowner. Because the land is close to a spring, the landowner gives the Biki'u farmer group to do water spinach farming. With a land area of 15 Ha with each group member entitled to 5 Are.

Cost

Costs are expenses or sacrifices incurred for production activity. Costs are divided into two parts, namely variable costs, and fixed costs.

1. Variable Cost

The variable costs in this study are labor costs and transportation costs, where:

a. Labor costs

There are two types of labor: workers in the family who are not paid or are invaluable in money. There are also

workers from outside the family, which are calculated with labor costs.

The results showed that all respondents in the farmer group worked without using external labor, meaning that they only needed labor in the family so that the workforce in the family was equalized as wage labor.

b. Consumption Cost

The total of all consumption costs such as cigarettes and betel nut expenditures is Rp. 20,000.00 with a total of Rp. 400,000.00

2. Fixed Cost

Fixed costs are costs involved in the production and do not change even though there is a change in the amount of kale production produced. Covers including fixed costs are.

a. Tax

The total land area of the Biki'u farmer group is 15 ha, with the total tax fee paid by the Biki'u farmer group in Napan Village every year is Rp. 27,500.00 or Rp. 1,833.33/ ha

b. Shrinkage

The cost of depreciation of agricultural equipment used by farmers in cultivating kale, such as machetes, hoe, sickle, meter, and raffia rope. From several depreciation costs, it is known that the total depreciation of the tools used by farmers is Rp. 2,481,875.00, with an average of Rp. 165,458.33 per ha.

So it can be seen that the total cost obtained from the sum of the total costs between variable costs and fixed costs is IDR 2,909,375.00 with an average cost of IDR 193,958.33 per ha.

Water spinach Production

The total production of kale in the Biki'u Farmer's Group in Napan Village obtained or obtained by farmers is 3,564 kg with a total average selling price of Rp. 11,000.00 per kg.

Water spinach Farming Acceptance

Revenue is a multiplication between the production of kale in 2020 and the selling price of kale.

Total revenue = Production x Price

= 3.564 x Rp.11.000,00

= Rp.39,204,000.00

So the total income received by water spinach farmers in the Biki'u Farmer Group in 2020 is Rp.39,204,000.00 with an average income of Rp. 2,613,300/ha.

Water spinach Farming Income for the Bikiu Farmer Group

Revenue is the result of subtracting the total revenue minus the total cost.

Revenue = Revenue – Expenses
= Rp. 39,204,000.00 – Rp. 2,909375.00
= Rp.36,294,625.00

Table 5. Analysis of water spinach farming income in Napan Village, North Bikomi District, TTU Regency.

No.	Description	Area	
		5 are	1 ha
1	Revenue (Rp)	130,680	2,613,600
2	Total Cost (Rp)	9,697.91	193,958.3
	Fixed Cost (Rp)	8,364.58	167,291.7
	• Depreciation	8,272.91	165,458.3
		91.66	1,833.33
	•Variable Cost (Rp)	1,333.33	26,666.67
	• Consumption	1,333.33	26,666.67
3	Income (Rp)	120,982	2,419,642

Source: Primer data after analysed, 2020.

So the total income obtained by water spinach farmers in the Biki'u Farmer Group in 2020 is Rp. 36,294,625.00 with an average of Rp. 2,419,641.67/ha.

Relative advantage(R/C ratio)
R/C ratio = Revenue/Cost
=39,204,000.00 / Rp.2,909,375.00
=13.47

So the R/C ratio of all members of the Biki'u Farmer Group was 13.47, meaning that every cost incurred will receive an income of 13.47 with the R/C ratio criteria >1 = profitable, so the vegetable business Water spinach in the Biki'u Farmer Group in Napan Village is profitable and needs to be improved in line with the research of Supristiwendi & Azizah, (2019).

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the results of the research and analysis of the application of water spinach agribusiness at the Biki'u Farmer's Group in Napan Village, it can be concluded that the general description of water spinach farming activities in Napan Village, North Bikomi District, starts from land processing, planting, maintenance, harvesting, post-harvest to marketing. From the results of the analysis of the application of water spinach agribusiness in the Biki'u Farmer's Group, Napan Village, it can be seen that the average income of kale in 2020 is Rp. 2,419,641.69/ha.

Suggestion

Based on the conclusion above, the writer suggests several things as follows:

1. It is hoped that the relevant agencies/agencies in setting policies will continue to improve guidance and training for farmers in North Central Timor Regency in general. The rest are expected to continue to provide assistance in the form of agricultural technology and counseling related to cultivation techniques to continue increasing the production of kale in the village. Napan, North Bikomi District, North Central Timor Regency
2. it is hoped that all people in Napan Village will continue to maintain water spinach farming, a superior traditional plant in the North Bikomi area because kale provides profitable income for farmers.

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