

PROFITS ANALYSIS OF POLYCULTURE OF MILKFISH AND DRAGON FRUIT IN SARANG BURUNG VILLAGE JAWAI DISTRICT

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Abstract

Food diversification is the effort to increase the availability of diverse foods based on the potential of local resources to support food security and improve community welfare. One way to achieve this is by developing diversified farming and fishing businesses. However, developing just one of these sectors requires more land, and land availability is decreasing in many areas. This is due to the conversion of land for industrial and residential use. As the population grows, the demand for food continues to increase. Additionally, the demand for fish as a source of protein is increasing due to growing public awareness of nutritional needs. Therefore, technological innovations are needed to accommodate these demands, one of which is polyculture. This descriptive study aims to identify the benefits of polyculture between milkfish and dragon fruit cultivation on the same land in Sarang Burung Danau Village Jawai District. The results show that polyculture between milkfish and dragon fruit is beneficial as a means of meeting the community's food needs and as a source of economic income.

Keywords: profit analysis, polyculture, jawai district

INTRODUCTION

Coastal development is necessary to utilize fishery resources, support economic development, and expand employment and business opportunities. The standard of living in coastal communities can improve if they have sufficient income to meet their needs. The income of these communities is inextricably linked to the amount of fish they catch and farm.

Polyculture is an integrated farming system that increases land productivity by allowing crops to be grown alongside fish farming. The community of Sarang Burung Danau village practices a polyculture pattern that involves farming milkfish and dragon fruit in the same pond.

In general, polyculture refers to the cultivation of two or more species in the same place and at the same time. The combinations used in polyculture consist of combinations of animal and plant species, combinations of aquatic animal species, or combinations of aquatic and terrestrial animal species (Stickney 2000).

The polyculture system was originally developed as an agricultural system, but is now also used in aquaculture systems. The aim is to increase the efficiency of feed utilization in ponds by taking into account the trophic level and feeding habits of the species being cultivated, so that fish growth will reach optimal biomass with the selection of the right species combination. (Aubin et al. 2014).

The community of Sarang Burung Danau Village in the Jawai District has only recently begun using the same land for milkfish and dragon fruit cultivation. The impact of the pandemic has reduced market demand for milkfish by 10-20%. This decline was caused by marketing difficulties and limited access to milkfish seeds due to transportation route restrictions between regions in Indonesia. In response to the prolonged pandemic, the community of Sarang Burung Danau Village planted dragon fruit on the embankments of their milkfish ponds.

The Indonesian people have long practiced polyculture systems. Initially, the goal of polyculture was to optimize land use and maximize income. However, as science has advanced, particularly in the field of fisheries, polyculture has also become a means of preventing the spread of disease.

In a polyculture farming system, land is used to grow more than one final product. This system increases land use efficiency and can sustainably increase farmers' income. Polyculture is based on the principle of natural balance. Dragon fruit plants produce oxygen and absorb CO₂. Milkfish waste and other organic materials can provide nutrients for the growth of dragon fruit plants.

Bumina-Yumina is a cultivation system that is a modification of the aquaponics system. Bumina-Yumina is a cultivation system that combines fish with fruits, seasonal fruit-producing plants (Bumina) and fish with vegetables, leafy vegetable-producing plants (Yumina) (Supendi et al 2015).

In fact, in recent years, the Bumina-Yumina system has been further developed into fish farming in buckets or budikdamber, which combines fish farming with aquatic plants such as kale (Susetya & Harahap 2018).

The advantages of this cultivation system are that it can optimize land and water use, increase farmers' profits, is environmentally friendly, and avoids the use of chemicals because waste from fish farming is used as fertilizer for plants (Maulana et al. 2018; Nugroho et al. 2018).

Polyculture farming of dragon fruit and milkfish can increase the efficiency of pond and fish farmland while increasing farmers' income in a sustainable manner. In polyculture farming, the possibility of losses is minimized because if one commodity fails to produce, it can be offset by the successful production of other polyculture organisms.

Considering the characteristics of cultivated organisms that complement each other optimizes the utilization of available nutrients.

RESEARCH METHOD

Data collection for this study was conducted using observation and interview techniques. Observation and interview techniques were used to obtain information about milkfish and dragon fruit farming businesses in the village.

This study examined the total number of farmers who cultivated milkfish and dragonfruit on the same land in Sarang Burung Danau Village, Jawai District. The sample was selected from the community that carried out the cultivation, consisting of two farmers.

This study used the following analysis:

a. Cost Analysis

$$TC = TFC + TVC$$

TC : Total Cost

TFC : Total Fixed Cost

TVC : Total Variable Cost

b. Revenue Analysis

$$TR = P \times Q$$

TR Total Revenue

P : price

Q : quantity

c. Net Profit

$$\pi = TR - TC$$

π : net profit

TR : Total Revenue

TC : Total Cost

RESULT AND DISCUSSION

General Description of the Research Location

The Sarang Burung Danau village is located in the Jawai district of the Sambas regency. Jawai district is located in the westernmost part of Sambas Regency between 1°11' and 1°32' North Latitude and 108°57' and 109°08' East Longitude. Sarang Burung Danau Village is administratively divided into four hamlets, nine RW (neighborhood associations), and 19 RT (community associations). The village has a population of 6,470 and covers an area of 7,245 hectares (72.45 km²), which is 37.25% of the total area of the subdistrict. The village is bordered by the following :

- a. North : Borders Simpang Empat Village, Tangaran district

- b. East : Borders Tri Mandayan Village, Sekura Village, and Sungai Kumpai Village
- c. South : Borders Sungai Nilam Village, Jawai district
- d. West : Borders the Natuna Sea

Polyculture systems offer more benefits than monoculture systems. There are several advantages to polyculture systems :

- a. Environmental aspects: In polyculture systems, plants can utilize fish waste or feces, thereby maintaining the quality of the aquatic environment and serving as a natural source of feed.
- b. In terms of production, polyculture systems are superior to monoculture systems because they can produce both fish and crops. This is because polyculture systems allow for the harvesting of two or more different types of commodities from a single cultivation area.
- c. The economic aspect of the polyculture system involving fish and dragon fruit production certainly contributes to economic improvement.

Jawai Subdistrict is one of the centers for milkfish and dragon fruit production in Sambas Regency. There are 35 farmers who cultivate milkfish in Sarang Burung Danau Village, but only two farmers apply a polyculture system between milkfish and dragon fruit cultivation.



Figure 1. Dragon Fruit Plants in Milkfish Ponds

Fisheries Sector

The Jawai subdistrict is an area located on the coast and sea that has potential for brackish water aquaculture. The cultivation of milkfish is one of the livelihoods of the people of the Jawai subdistrict, one of the most common being in the village of Sarang Burung Danau. Based on field survey results, each farmer in Sarang Burung Danau Village has at least 3 hectares of ponds, with some having up to 60 hectares. However, not all ponds in Sarang Burung Danau Village use a polyculture system; only two pond owners practice polyculture between milkfish and dragon fruit. The respondents, Mr. Sulaiman and Mrs. Melur, have the same pond area for cultivation, namely 4 hectares for milkfish cultivation and 1 hectare for dragon fruit cultivation. The milkfish harvest cycle is approximately once every 4 months with an average yield of 1.5 to 2 tons.

The selling price of milkfish from pond farmers is Rp20,000 - Rp25,000 per kg. The results of the study show that the average net income of milkfish pond farmers is Rp18,330,000 per harvest cycle, so that in one year the average income of farmers from milkfish farming is Rp54,990,000.

Agriculture Sector

Dragon fruit is a type of perennial plant that commonly grows in tropical regions. Dragon fruit can bear fruit at 8 months of age or older, depending on soil conditions. Dragon fruit has a productive life span of 15 to 30 years. The dragon fruit cultivated by farmers in the village of Sarang Burung Danau is the red dragon fruit (*Hylocereus polyrhizus*). The high demand for dragon fruit has motivated pond farmers to cultivate dragon fruit on pond embankments. According to consumers, dragon fruit cultivated around ponds has a sweet taste. The selling price of dragon fruit ranges from IDR 10,000 to IDR 15,000 per kg. The dragon fruit harvest period in one month can be up to 4 harvests, and each harvest can produce 300 kg of dragon fruit.

The average income from dragon fruit sales is Rp. 4,500,000 per harvest cycle. Thus, the average monthly income for farmers is Rp. 18,000,000.

Community Welfare

Using agricultural land for polyculture can increase productivity and provide ecological, economic, and social benefits. Production operating costs can be reduced by utilizing the same land for multiple crops and reducing the need for fertilizer, feed, irrigation, and dragon fruit maintenance.

The advantage of this polyculture system is that farmers receive two sources of income from the same land. Polyculture contributes more to income than monoculture does. Analysis shows that this system benefits farmers by providing food for their households and generating income.

The increase in farmers' income has improved the welfare of farmers and their families. The successful cultivation of milkfish and dragon fruit has reduced unemployment and urbanization in Sambas Regency. Previously, many people sought livelihoods in Malaysia as Indonesian migrant workers.

CONCLUSION

This study found that polyculture farming systems offer several ecological benefits, including efficient land use, improved water quality, disease control, and reduced dependence on artificial fish feed. From a social and economic perspective, the cultivation of milkfish and dragon fruit can enhance community welfare and income, suggesting that this polyculture has the potential to bolster food security and the local economy in Sarang Burung Danau Village and its surrounding areas.

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