

Catfish Culture Techniques with Aquaponic Systems in the Elderly Group as an Effort to Increase Productivity and Economic Independence of the Community in Pakal District, Surabaya

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Abstract

Fish farming is an activity to maintain fish in a controlled environment for a certain period to get results with a certain value. Fish farming activities can be carried out on a household production scale, by modifying science and technology so that it becomes an activity that can be carried out by various levels of society. Catfish (*Clarias* sp.) is one of the most widely used fishery commodities by people who carry out fish farming activities on a household scale. In addition to its delicious and savory taste, catfish is not susceptible to disease, so it is easy to culture on a household scale. In line with the need for community economic independence, food security, and community productivity in utilizing the potential of existing resources, assistance for catfish farming activities is carried out in the elderly group in Pakal sub-district, Surabaya.

Keywords: Community development. Catfish. Aquaponic. Aquaculture

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Introduction

The city of Surabaya is located between 07° 9' to 07° 21' south latitude and 112° 36' to 112° 54' East Longitude. The area is low land with a height of 3-6 meters above sea level, except in the south at an altitude of 25-50 meters above sea level sea level. Until the end of 2021, the city of Surabaya is divided into 31 sub-districts. The sub-district with the largest area is

Benowo District, which is around 23.73 km². The population of the city of Surabaya in 2021 is recorded at 2.88 million people with the highest population growth rate in Pakal District, which is 2.45% during the years 2019-2021. The population density of Pakal District in 2021 is recorded a total of 3,256 inhabitants/km², of which 1,064 were male and 1,008 were in the 60- 64 years (Central Bureau of Statistics, 2022).



Catfish (*Clarias* sp.) is a freshwater fishery commodity that is favored for become a commodity in cultivation activities. This is because catfish have advantages such as fast growth, good disease and stress tolerance, easy maintained and high productivity (Episar et al., 2018). Catfish also has taste delicious, cheap and nutritious (Wahyuni, 2015). Therefore, many people who carry out catfish farming activities, including in Surabaya. As one of the areas in East Java that produces cultured catfish, Surabaya is known to produce catfish up to 797.29 tons in 2014 (DKP East Java, 2017). This value increased when compared to production in 2011 with total production is 706.02 tons (DKP East Java, 2012). As a big city with density high population and narrow land, catfish production in Surabaya is one of the alternative that can be done in order to improve the economy of the people who independent and sustainable. This is in line with the efforts of the Surabaya City government promote urban farming as a form of self-reliance community economy.

One of the methods that can be developed in catfish farming in narrow areas is with aquaponics. Aquaponics is a cultivation concept that combines aquaculture or aquaculture with hydroponics or agricultural cultivation in Indonesian limited land. Simply put, aquaponics is an alternative to growing plants and keep fish in one container. Products obtained from aquaponics activities are vegetables (plants) and fish. Aquaponics is becoming a model for food production which emphasizes the concept of nutrient

flow that combines the principles of ecological principles so that this technology is more natural and very environmentally friendly, produce organic products because they are free from chemical contamination (eg; disinfectants, pesticides, antibiotics, etc.).

Material and methods

The partner groups targeted for this community service activity are: elderly group located in Griya Benowo Indah, Pakal District, Kota Surabaya. This elderly group was selected based on the interest of the partner group towards the need for assistance in community activities in the field of fish farming. Group the elderly already have a catfish pond that is run on a mini scale (in buckets) with the concept and results of cultivation that runs as it is. So it feels necessary mentoring activities to introduce technology and concepts of fish farming easy to apply on a household scale. This activity targets a group of elderly people in the Griya Benowo Indah area who are still active in improving the economy through independent catfish farming. Community service activities consist of several stages, including:

1. Site survey

This activity is carried out to determine the condition of the community service location which aims to identify the needs for developing fisheries potential and improving the economy being carried out. Based on the survey results, it is known that the elderly community in Griya Benowo Indah already have catfish farming activities

in a minimalist manner with perfunctory knowledge.

2. Modernization of cultivation activities with the application of technology

This activity was carried out as an effort by the community service team to assist the application of technology in the fisheries sector with the aim of increasing the economy of the elderly group independently. This activity is in the form of repairing the cultivation location, in this case repairing the cultivation pond by adding construction in the form of channels/additional media used for cultivating plants and fish. Apart from that, this activity also included the introduction of a water quality monitoring tool that is integrated with a mobile phone called "Amtida". Amtida is a water quality monitoring tool that is integrated with a mobile phone, making it easier for cultivators to monitor water quality more practically and without the need to visit fish farming locations. The design of the aquaponics system also considers the area of land and land conditions as well as sufficient solar lighting.

3. Counseling and evaluation monitoring

This activity is an enrichment of material provided by the community service team after providing assistance on how to cultivate fish and plants (aquaponics). Activities are carried out in the form of workshops and transfer of knowledge directly to the community, as well as solving problems during the fish farming process.

Results and discussion

Aquaponics is an integrated cultivation system between aquaculture (fish farming) and hydroponics (plant production), with the application of a recirculation system. Aquaponic technology is able to produce fish optimally on narrow land and limited water sources, so that it becomes one of the development concepts for several big cities as the concept of urban farming. In addition to producing fish as a result of aquaculture products, aquaponics also provides added value in the form of the production of hydroponic plants or vegetables that can adapt to the preferences or needs of the surrounding community. The application of aquaponics technology is a solution for areas that are limited in water but have the potential for human resources to drive fishing activities. This demographic character was found in the elderly group of Griya Benowo Indah.

The aquaponic system has the concept of using water continuously from raising fish to plants, and vice versa. This system is claimed to be a technology that saves land and water and can be combined with various vegetable crops. Apart from that, aquaponics also carries the concept of a biofilter, which can have an impact on improving the water quality of fish rearing media, especially the reduction in ammonia (NH₃) content (Nugroho et al., 2012)



A



B

Figure 1. The Aquaponic Pond of the Griya Benowo Indah Elderly Group. A : Aquaponic construction. B : Pond installation

The aquaponic pond used in this community service activity is a tarpaulin pond containing catfish seeds with bamboo and paralon construction. Pond size used 1 m x 3 m x 0.5 m with density of fish 2 fish/m³. The vegetable plant used is pakcoy (*Brassica rapa*). The vegetable used can absorb fish culture waste, so that water containing fish feces (faeces) can be absorbed by the vegetable roots (used as natural fertilizer). The existence of a biofilter, which roled by the plant, causes the quality of pool water to be maintained (Setijaningsih and Suryaningrum, 2015; Rini et al., 2018; Wijayanti et al., 2019). The fish commodity chosen to be cultivated in the pond is tilapia fish. Pakcoy plants are used with the consideration of their high economic value and can be used as consumption material for the surrounding community. Apart from that, the pakcoy

plant is a vegetable that has a high need for N value, and this requirement can be taken from the faeces of cultivated fish. Water quality parameters such as pH can also affect the quality of pakcoy growth (Astuti and Larasati, 2019). Based on the research results, pakcoy plants grown using the aquaponics method have a specific growth rate of 2.76% (Ariadi et al., 2020)

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