KONTRIBUSIA, Vol 3, Issue 2, 2020
ISSN 2614-1582 E-ISSN 2614-1590
Published by Research and Community Development Center

Utilization of Land With Aqua-Ponic Systems, Mustard Greens and African Catfish

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Abstract

Food needs in urban areas are increasing along with increasing population growth. The problem of population growth in urban areas is always followed by the construction of housing facilities. The development of housing facilities has an impact on the availability of land and water resources for fish farming and agriculture. Aquaponics technology is a combination of aquaculture and hyroponics technology in one system to optimize the function of water and space as maintenance media. Aquaponic system is a system that offers solutions related to narrow land use and limited water resources for fish and plant cultivation activities. In this community service activity, the aquaponics system was introduced to the community in the Dahanrejo area, with several activities carried out including the creation of an aquaponics unit, counseling and training given to the community on this aquaponics technique and unit. In carrying out community service activities there are several stages that need to be carried out including: location surveying, designing and testing of acuponic technology, counseling and training, monitoring and surveying. From the activities carried out, 20 people received training on how to use the land for freshwater fish cultivation and crop cultivation using aquaponics technology. In addition, an aquaponic unit was handed over to the kelurahan as a model for the existing community.

Keywords: aquaponics, African catfish, land use, mustard.

Received: 18 May 2020. Accepted: 06 August 2020.

Introduction

Location of Gresik Regency is located in the northwest of Surabaya City which is the Capital of East Java Province with an area of 1,191.25 km^2 which is divided into 18 Districts and consists of 330 Villages and 26 Kelurahans. Geographically, Gresik Regency is located between 112 ° to 113 ° Longitude East and 7 ° to 8 ° South Latitude and is a lowland with a height of 2 to 12 meters above sea level. Dahanrejo is a village in Kebomas District, Gresik Regency, East Java, Indonesia.

Dahanrejo Village is a village in Kebomas District, Gresik Regency, East Java, Indonesia. North of the Sacred Village of Manyar District.

The south is bordered by Banjarsari Village, Cerme District. The west side is bordered by Ambeng-ambeng Village of Duduk Sampeyan District. East side is bordered by Kembangan Village, Kebomas District. Dahanrejo village has an area of ± 327,664 ha.

In general, the livelihoods of the people of Dahanrejo Village are farmers, private employees, UKM. Utilization of yard to support the economy and nutrition of the community in agriculture and freshwater fisheries is one of the strategies that can be done in urban or residential areas. One of the characteristics of yard is small area and limited water source (Dauhan et al., 2014). One solution to deal with this problem is with aquaponics technology.

Aquaponics technology is a combination of aquaculture and hyroponics technology in one system to optimize the function of water and water as a maintenance medium (Nugroho et al., 2012). The advantage of this technology is the optimization of the area and water resources where in this system two different commodities can be produced on the same land area (Siregar et al., 2013). Population density in the village of Dahanrejo Kidul causes several problems including a small productive land area. As a residential expansion area, existing land is used for the construction of housing units which results in high density housing units and reduced productive land. The problem faced by partners in this regard is the lack of productive land that can be used for aquaculture and terrestrial fisheries which results in the lack of businesses that can sustain the economy and nutritional needs of the household scale.

Method

In carrying out community service activities there are several stages that need to be carried out including: location surveying, designing and testing of acuponic technology, counseling and training, monitoring and surveying. These stages were carried out at the location of the Laboratory under the campus of Muhammadiyah University Gresik. integrated approach that is carried out from the initial socialization process and plans during the activities take place effectively about 2 months. In the initial outreach, the team invited mothers who joined the PKK group to socialize the activities carried out so that effective and reciprocal communication took place.

How to manufacture

1. Use a welding tool to make an iron plate rack. The iron plate rack will be used as a support container for plants. The iron plate is 140cm long, 100cm wide, and 90cm high.
2. Measure the height of the 80cm long reservoir, mark it in a circle, then cut. The water reservoir used as an aquaculture subsystem is the lower part of the reservoir.
3. Give a hole on one side of the upper reservoir with the help of a drilling machine. This hole will be used to connect a series of pipe pipes from the water output system.
4. Place the aquarium pump at the bottom of the reservoir, then connect the pump with a pipe.
5. Install the water tap on the paralon pipe connected to the aquarium pump. The position of the tap is at the top of the reservoir but it is under the gutter of the plant container
6. Cut the water chamfer 100 cm long then put a lid on the ends of the gutters. Make as many as 8 units.
7. Make a hole in one of the bottom of the gutter with the help of a drilling machine. Do it on all eight chamfer units that have been prepared. Then glue the connecting pipe (shock) to the hole that was made earlier.

8. Create a series of paralon pipes for the water input system from the aquaculture subsystem to the vegetable cultivation subsystem with the help of the T and L form of paralon connections.\
9. Place the water pipe input system paralon pipe at the base of the gutter. Connect the faucet in the middle of the paralon pipe series. The tap serves to regulate the size of the flow of water that will enter the vegetable cultivation subsystem.
10. Create another series of paralon pipes for the water output system with the help of the T connection and the L paralon connection. Water will flow back from the vegetable cultivation subsystem to the aquaculture subsystem.
11. Connect the paralon pipe circuit with the bottom of the gutter which has been perforated and given a paralon connector (shock).
12. Insert the ends of the water output system paralon circuit into the hole that has been made on the upper side of the reservoir.

Result and Discussion

Figure 1. Aquaponics Socialization

In this initial meeting, the purpose and objectives of this activity were discussed as well as asking for cooperation agreement with the kelurahan as facilitator. The design and testing of aquaponics technology was carried out in the laboratory of Muhammadiyah University Gresik by involving students in the aquaculture study program. The design and assembly of this aquaponics unit uses materials and tools that have been previously proposed. This stage resulted in an aquaponic technology unit consisting of a series of crop cultivation units and a series of fish farming units.

Aquaponics technology education and training activities were carried out on April 10, 2020. This activity involved several community elements, ranging from PKK activists, RT and RW heads, and community leaders. This activity provides counseling on fish farming in general, nitrification and amonification processes by bacteria in symbiosis with plants, as well as counseling about aquaponic systems that can be applied at the household scale.

The counseling was attended by 20 participants representing the community of Dahanrejo Village. In addition to counseling, in this stage training activities are carried out namely training in the design and assembly of the aquaponics system unit delivered by the organizers and accompanying students which are carried out directly at the location of the activity.

Implementation of aquaponics manufacturing activities has been carried out in Dahanrejo Village, Kebomas District, Gresik Regency to find solutions to existing problems and empower women. Through making aquponik by utilizing local commodities, it is expected to increase the knowledge and expertise of these mothers, so as to increase income and help families improve the economy.

Figure 2. Aquaponics System Application

Conclusion

From the activities we have carried out in Dahanrejo Village, starting on April 10, 2020, many lessons can be learned. This activity was held as a form of community service by applying science in accordance with the field of science. The role and support of the community also contributed to the success of all activities carried out.

Cohesiveness, communication and teamwork also influence the success of the activities carried out. Respect and respect are needed to maintain togetherness and harmony.

We realize that the contribution we make to the community is still not optimal. This happened because of internal and external limitations that we still could not resolve. Nevertheless, we have tried our best to provide all the best things in carrying out this activity. It is hoped that the activities we have carried out can bring this village to become more advanced and prosperous.

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