Household Scale-Low Input Farming for Community Food Self-Sufficiency After the Covid-19 Pandemic in Yogyakarta Special Region Province, Indonesia

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ABSTRACT

Population growth increases the demand for world food needs. Meanwhile, the agricultural sector's challenges are increasing due to reduced agricultural land, climate change, and natural disasters. The covid-19 pandemic teaches us the importance of precision agriculture to produce optimal food products with minimal input. This study aims to introduce low-input farming practices at the household scale. Low-input farming (LIF) was chosen because its production costs are relatively low with low inputs. Low-input farming is an agricultural practice that maximizes the use of land resources, ensures the achievement of profits, minimizes environmental damage and negative impacts, and prevents adverse effects on health. The study was carried out in partnership with women farmer groups. This study introduced three main programs to support food self-sufficiency at the household scale: hydroponics, aquaponics, and training in processing processed food products made from fish. The selection of program types was determined based on the community's needs following the community's economic capacity to provide inputs in cultivating food crops on a household scale. Intensive assistance was also carried out by a team of experts from agronomy, environmental science, and food technology to ensure the successful implementation of the program. In addition, agricultural inputs with hydroponics in planting media, seeds, and fertilizers are available at low and affordable prices with optimal yields. Meanwhile, for aquaponics, the cultivation of vegetable and fish were introduced in one cultivation medium. The selected plants and fish were species that can grow easily in various climatic conditions and were widely consumed by the community. The training on processing processed food products from fish continues the other two programs. This program increases the knowledge of farmer groups to process fish so that it can increase the added value of fish harvests as well as for household consumption.

Keywords: Covid-19 Pandemic, Food Self-Sufficiency, Hydroponic, Household Farming, Low Input Farming.

1 Introduction

The Covid-19 pandemic has changed various human activities, including agriculture in rural areas. After the pandemic, various activities began to recover, including agricultural activities in rural areas. Apart from being the main food production area for urban areas, rural areas also have another potential, i.e., the availability of large enough yards. Household-scale farming carried out by cultivating the house's yard can be relied upon in realizing household-scale food self-sufficiency. However, household-scale agriculture also faces the same challenges as conventional agriculture, which cultivates large-scale agricultural land, such as relatively high production costs and negative impacts on the environment due to agricultural activities.

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Intensive agricultural practices using excessive inputs cause damage to agricultural land and leave several environmental problems, such as soil erosion and sedimentation downstream [1]. Ultimately agricultural practices and the use of excessive inputs lead to low land productivity and also low yields. Agriculture with low costs and low negative environmental impact is a solution to overcome these problems.

Low-input farming (LIF) allows low-cost farming practices and a low risk of environmental damage [2]. LIF provides a promising alternative to small-scale agriculture in rural areas, including household-scale farming that utilizes home yards. In LIF practice, all inputs are measured as needed and can produce maximum yields. Agricultural inputs such as fertilizer, land, water, and seeds are easy to procure. Nevertheless, the LIF concept must be appropriately introduced to the public to follow the fundamental principles in practice. In the present study, the concept of LIF was introduced for household-scale farming by involving the women farmer group or Kelompok Wanita Tani (KWT) implemented through a community empowerment program. The purpose of introducing LIF through this study is to support the realization of community food self-sufficiency. The concept of LIF was taught along with ILF implementation practices in the form of hydroponics and aquaponics introduction [3]. The practice of hydroponics and aquaponics will strengthen people's understanding of the LIF concept.

2 Methodology

The community empowerment program was performed in Sidoluhur Village, Godean Sub-Regency, Sleman Regency, Special Region of Yogyakarta Province, Indonesia (Figure 1). Three women farmer groups (KWT) have become partners in implementing the activities: KWT Sidomaju, Sokka Indah, and Rukun Punden.

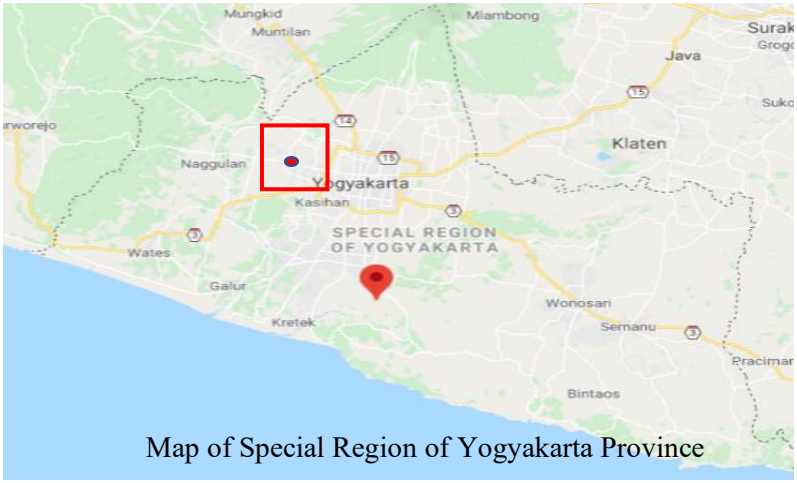

Figure 1. *Map of Sidoluhur Village.*

The method consists of several stages, such as socio-economic surveys, socialization of activities, program implementation, field assistance, and monitoring. The Socio-Economic Survey is part of identifying the latest problems in the field to synchronize the purpose of LIF introduction with community needs or related problems that exist in the community through direct discussions with village officials and community leaders in the village. After collecting information, the activity continued with program socialization. The next stage is the program's implementation, namely the introduction of LIF and its practice in hydroponics and aquaponics. The next activity is field assistance and monitoring of the program.

3 Results and Discussion

In practice, LIFT is accompanied by training in processing fish-based food products from aquaponics. This training is a form of LIF implementation from cultivation to product processing resulting from LIF

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practice. In general, the activities in this research, such as hydroponic, aquaponics, and fish-based food processing training, have been carried out well. These activities reflect the application of low-input farming from upstream (cultivation) to downstream (processing of cultivated products). The beneficiary community's (KWT) response to this activity was good. Some of the achievement targets of this activity can be adequately met, such as a high level of community participation and a high level of public understanding of the technology introduced. Finally, it is proven by the community's (KWT) success in implementing the technology that has been introduced.

3.1 Introduction to Hydroponic Technology

Hydroponics was introduced to utilize household-scale yard land for cultivating vegetables. Through this hydroponic training, the people of Sidoluhur Village, especially KWT members, have become aware of low-input farming by utilizing their yards for vegetable cultivation. In addition, two types of hydroponics are introduced, i.e., large-scale and small-scale hydroponics, as shown in Figure 2.

Figure 2: *Hydroponic Training for KWT in Sidoluhur Village.*

Large-scale hydroponics has higher productivity but requires higher costs to make hydroponic units. Some materials needed include pipes, water boxes, hydroponic frameworks, and water pumps. Small-scale hydroponics requires lower costs and is relatively affordable for the community but requires perseverance so that vegetable plants can grow optimally. In addition, hydroponics allows agricultural practices with narrow land to meet the community's food needs [4].

3.2 Introduction to Aquaponic Technology

Aquaponics was carried out by cultivating fish in buckets (*Budikdamber*) to optimize land use in the yard. Catfish were selected in the aquaponics system. This fish was chosen because the local people widely consume it, and it is also suitable for cultivation with this method [3]. This fish farming method applies the LIF principle because it optimizes the function of the community's yard for catfish farming and kale cultivation (Figure 3).

Figure 3*: Budikdamber Technology for Fish Cultivation.*

Budikdamber technology has been developed in several regions in Indonesia. This technology is effective and efficient because it does not require large areas of land and can produce fish and vegetables simultaneously. Therefore, the application of *Budidkdamber* technology is one of the solutions to achieve household-scale food self-sufficiency during and after the Covid-19 pandemic [5].

3.3 Food Processing Training

Processing food made from fish as a result of *Budikdamber* so that KWT members can understand proper food processing (Figure 4). So that, later, KWT members can properly process the yields from *Budikdamber*.

Figure 4: *Food Processing Training in Sidoluhur Village.*

Food processing training was conducted by inviting practitioners in processing fish products as trainers. In addition, food processing training for village communities, especially KWT members, can increase their ability to achieve sustainable development [6].

In general, the whole program can be implemented according to plan. Intensive assistance, either directly or indirectly, can increase the community's understanding of the LIF concept. Implementing LIF through aquaponics and hydroponics has increasingly increased community understanding of implementing conservative farming.

4 Conclusions

Low-input farming practices on a household scale with intensive assistance produced good yields to support community food self-sufficiency after the covid 19 pandemic. Funding through community empowerment activities can increase community knowledge and skills in applying the LIF concept.

5 Declarations

5.1 Study Limitations

Provide all possible limitations in the study that might significantly affect the research outcome.

5.2 Acknowledgments

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