

Minigrow: A Smart Solution to Improve Household Food Security in Puduk Village

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ABSTRACT

Puduk Village is an Integrated Laboratory Village (Desa Laboratorium Terpadu/DLT) of the University of Jambi and serves as a center for agricultural, livestock, and fisheries activities. However, frequent flooding during the rainy season often reduces agricultural productivity and household income. To address this issue, a Minigrow Farm program was implemented to improve household food security and generate additional income through integrated small-scale vegetable cultivation and poultry farming. The program involved four housewives from the local Women Farmers Group (KWT) who had available yard space. Their home yards were converted into productive areas for growing vegetables, including pak choi, mustard greens, water spinach, and red spinach, and for raising laying hens. Activities were conducted using a learning-by-doing approach, consisting of two months of mentoring followed by two months of independent implementation. The results showed that vegetable production generated a total income of IDR 3,066,000 from two production cycles per month, while egg sales from 55 laying hens generated IDR 2,970,000 per month. The combined additional income reached IDR 6,036,000 for the four participating households. Participants also demonstrated improved knowledge and skills in integrated farming practices. The Minigrow Farm model effectively enhanced household food security, increased family income, and promoted sustainable use of household yard resources in flood-prone rural areas.

Keyword: Minigrow, Compost, Environment, Food Security, Integration

ABSTRAK

Desa Puduk merupakan Desa Laboratorium Terpadu (DLT) Universitas Jambi dan berfungsi sebagai pusat kegiatan pertanian, peternakan, dan perikanan. Namun, banjir yang sering terjadi selama musim hujan seringkali menurunkan produktivitas pertanian dan pendapatan rumah tangga. Untuk mengatasi masalah ini, program Minigrow Farm dilaksanakan guna meningkatkan ketahanan pangan rumah tangga dan menghasilkan pendapatan tambahan melalui budidaya sayuran skala kecil yang terintegrasi dengan peternakan unggas. Program ini melibatkan empat ibu rumah tangga dari Kelompok Wanita Tani (KWT) setempat yang memiliki lahan pekarangan yang tersedia. Pekarangan rumah mereka diubah menjadi area produktif untuk menanam sayuran, termasuk pak choi, sawi, kangkung, dan bayam merah, serta untuk memelihara ayam petelur. Kegiatan dilakukan dengan pendekatan belajar sambil melakukan, yang terdiri dari dua bulan pendampingan diikuti dengan dua bulan pelaksanaan mandiri. Hasilnya menunjukkan bahwa produksi sayuran menghasilkan pendapatan total sebesar Rp 3.066.000 dari dua siklus produksi per bulan, sedangkan penjualan telur dari 55 ekor ayam petelur menghasilkan Rp 2.970.000 per bulan. Total pendapatan



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tambahan yang diperoleh keempat rumah tangga peserta mencapai Rp 6.036.000. Para peserta juga menunjukkan peningkatan pengetahuan dan keterampilan dalam praktik pertanian terpadu. Model Minigrow Farm secara efektif meningkatkan ketahanan pangan rumah tangga, menambah pendapatan keluarga, dan mendorong pemanfaatan sumber daya pekarangan rumah tangga secara berkelanjutan di daerah pedesaan yang rawan banjir.

Keyword: Minigrow, Kompos, Lingkungan, Ketahanan Pangan, Integrasi

1. Introduction

Pudak Village is an Integrated Food Village because the community's businesses are agriculture, livestock, and fisheries. This village is innovative because it is willing to accept innovations, so that the community is always progressing [1]. Pudak Village is also a Laboratory Village of the University of Jambi [2]. DLT-Pudak Village is a center for livestock, fisheries, and agriculture. As an agricultural center, many rural women continue to work on farms to supplement their family income. This work is mostly done during the planting season. Additionally, Pudak DLT Village is a village that is frequently flooded during the rainy season. This condition causes a decline in family income. Therefore, Universities should provide solutions on how to improve family food security so that family income can increase and family needs can be met. This program will support the government's program to achieve Golden Indonesia in 2045, if the community can become smarter in managing natural resources, and this should certainly start from the family [3]. Mini grow Farm is an integrated farming business model that combines livestock, crops, and fisheries. Mini Grow Farm in rural areas is a small-scale agriculture and livestock system implemented in rural areas to increase family food productivity, utilizing local resources, and support the economic independence of farming households. This system emphasizes the utilization of narrow land in yards or around houses, the use of local inputs such as organic fertilizers and fermented feed, and sustainable management with an agroecological approach.

The Minigrow Farm concept is closely related to the principles of small-scale integrated family farming, which has been recognized as an effective strategy for improving household food security, income generation, and rural sustainability. Evidence from Poland shows that small family farms play a crucial role in food production while simultaneously supporting household consumption and income generation through diversified agricultural activities [4]. The integration of crop and livestock production allows efficient resource utilization, reduces dependence on external inputs, and enhances the resilience of farming households. Furthermore, small farms contribute not only to agricultural production but also to environmental sustainability, social cohesion, employment creation, and the provision of healthy and affordable food products [5]. Due to their multifunctional role and their ability to combine production and household consumption, small integrated farming systems have been considered strategic assets for strengthening food security and rural livelihoods, particularly during periods of economic and environmental uncertainty [6]. These successful experiences indicate that the Minigrow Farm model has strong potential to be adopted as a pilot project in Pudak Village to improve household food security, increase family income, and enhance the resilience of rural women in flood-prone areas.

Unlike the urban farming concept, which mainly emphasizes technological adaptation in limited spaces [7], the Minigrow Farm concept in rural areas focuses on optimizing home yards for integrated agricultural activities, including vegetable cultivation, small-scale livestock farming such as chickens, ducks, and goats, as well as fish ponds. This approach promotes the integration of agriculture, livestock, and fisheries within a single system. In addition, the program emphasizes the utilization of local resources, such as household organic waste, which can be processed into compost or animal feed to support sustainable farming practices. The implementation of integrated farming systems also encourages efficient resource use and environmental sustainability. Furthermore, the active involvement of families and local communities in farm management plays an important role in strengthening community participation, improving household food security, and enhancing rural economic resilience.

This mini grow farm also functions as a form of household-based microbusiness that can increase income, improve food security, and reduce the economic vulnerability of rural communities, especially in times of crisis such as pandemics or lean seasons. This model can be applied to farming families by designing several businesses into one business called a Mini grow Farm, where very simple activities can provide additional household income. Minigrow farms are a model of livestock and crop integration, also known as a closed-loop system, which can reduce dependence on external inputs and take ecological considerations into account. Crop

and livestock integration is a sustainable agricultural system, also known as a techno-ecological system, which can generate higher incomes compared to systems without integration [8]. This pattern is a model of utilizing yard space to provide additional family income when the village experiences flooding. The application of the Minigrow Farm model is expected to foster creativity and an entrepreneurial spirit among rural women, as implementers of family activities that can increase family income and welfare. Rural women have free time to engage in various businesses to increase family income. The inability of rural women to be more productive is due to their low capacity and insight in generating business creativity. The skills needed to develop are minimal, so rural women become weak. They generally use their free time to become farm workers. Therefore, it is necessary to implement Minigrow Farm as an entrepreneurship-based family business to produce women who are more productive and creative in conducting businesses to increase income. Through this activity, it is hoped that women in the family will be able to improve family food security because they have a high opportunity as an additional family business [8].

The target to be achieved from this activity is to improve the capabilities of families, which will be carried out by rural women in order to increase family income, thereby becoming independent and resilient women in facing their future lives.

2. Methods

This community partnership program was conducted in Pudak Village, Muaro Jambi Regency, Indonesia, for four months. The activity involved four housewives who were members of the local Women Farmers Group (Kelompok Wanita Tani/KWT). Participants were selected purposively based on the following criteria: (1) residing in flood-prone areas of Pudak Village, (2) having available yards having an interest in developing household-based income-generating activities.

The program adopted a Participatory Rural Appraisal (PRA) approach combined with a learning-by-doing method to encourage active participation throughout the implementation process [9]. The intervention consisted of two months of intensive mentoring and training followed by two months of independent practice by participants. Training materials included household food security, integrated farming systems, vegetable cultivation techniques, laying-hen management, utilization of organic waste as fertilizer, and simple farm business management.

Demonstration activities were carried out using vegetable seeds (pak choi, mustard greens, water spinach, and red spinach), planting containers, organic fertilizers, and 55 laying hens. Participants were directly involved in land preparation, planting, poultry management, harvesting, and product marketing.

Program effectiveness was evaluated through pre-test and post-test assessments to measure changes in participants' knowledge and perceptions regarding integrated farming and household food security. Additional evaluation indicators included participant attendance, adoption of Minigrow Farm practices, vegetable and egg production, and income generated from the sale of agricultural products. The success of the program was determined by increased participant knowledge, successful establishment of Minigrow Farm units, continuous production of vegetables and eggs, and additional household income generated during the implementation period.

3. Results and Discussion

The implementation of the Minigrow Farm program began with a survey and assessment of the participants' home yards to determine their suitability for the intervention. Four housewives from the local Women Farmers Group (KWT) were selected based on predetermined criteria, including their willingness to adopt new innovations and the availability of yard space that could be developed for integrated farming activities.

3.1 Yard design for minigrow farm implementation

The initial assessment revealed that most yards were underutilized and had the potential to be transformed into productive spaces for vegetable cultivation and poultry production. Following the site assessment, participants received training on the Minigrow Farm concept, including its objectives, benefits, and practical implementation. The training emphasized the efficient utilization of locally available resources and agricultural waste, such as plastic containers, goat manure, and oil palm fronds, to support sustainable farming practices.

Participants were introduced to integrated farming principles that combine vegetable production and poultry raising within a household-scale system to improve food availability and generate additional income.

To support the implementation process, participants were provided with various vegetable seeds, including pak choi, mustard greens, red spinach, water spinach, bitter melon, cucumber, and purple eggplant. The participants were encouraged to design their own yard layouts creatively according to the available space and household conditions. In addition, training sessions were conducted on the use of social media platforms, such as TikTok, Instagram, and Facebook, as learning resources for vegetable cultivation techniques and as potential tools for product promotion.

Further capacity-building activities included training on postharvest handling, packaging of ready-to-harvest vegetables, and simple farm business record-keeping. These activities were intended to strengthen participants' entrepreneurial skills and improve their ability to manage household-based farming enterprises. The transformation of participants' yards from underutilized spaces into productive Minigrow Farm units demonstrated the feasibility of applying integrated farming systems at the household level. The visual changes in yard conditions before and after the implementation of the program are presented in Figure 1.



Figure 1. Conditions of participants' home yards before and after the implementation of the Minigrow Farm program.

3.2 Preparation and Establishment of Laying Hen Units

Following the completion of the yard development stage, the Minigrow Farm program was expanded through the introduction of laying hens as a source of household animal protein and additional income. Each participating household received laying hens that were managed in simple coops constructed within the Minigrow Farm area. The integration of poultry production with vegetable cultivation was designed to maximize the utilization of limited yard space while creating a mutually supportive production system. In this integrated system, vegetables provided fresh food for household consumption, whereas egg production

contributed both to nutritional improvement and income generation. The establishment of laying hen units also enabled the utilization of poultry manure as organic fertilizer, thereby supporting sustainable nutrient recycling within the farming system (Figure 2).

3.3 Technology and Innovation Products

The main innovation introduced through this program was the Minigrow Farm business model, a household-scale integrated farming system that combines vegetable production and poultry raising using locally available resources and agricultural waste materials [7]. Household yards were transformed into productive farming areas through the utilization of goat manure, poultry manure, oil palm fronds, used gallons, plastic bottles, and other recyclable materials. This approach not only reduced production costs but also promoted environmentally friendly farming practices through waste reutilization.



Figure 2. Design of the Laying Hen Coop Developed under the Minigrow Farm Program

3.4 Application of Technology and Innovation in the Community

The implementation of the Minigrow Farm model was carried out using a Participatory Rural Appraisal (PRA) approach combined with a learning-by-doing method. This approach encouraged active participation by the farmer women throughout the planning, implementation, and evaluation stages of the program. Rather than acting solely as beneficiaries, participants were directly involved in designing, establishing, and managing the integrated farming system, thereby enhancing their understanding and ownership of the innovation [9].

The program was further supported by the involvement of university students as part of the university's experiential learning initiative. Students assisted in preparing materials and equipment, designing Minigrow Farm layouts, supporting the establishment of vegetable plots and poultry units, and monitoring the implementation of farming activities. Collaboration among the university team, students, and participants facilitated knowledge transfer and strengthened the adoption of integrated farming practices. The active participation of all stakeholders contributed significantly to the successful implementation of the Minigrow Farm model and demonstrated its potential as a sustainable strategy for improving household food security and increasing the economic resilience of rural families.

3.5 Impact of Minigrow Farm on Household Income and Food Security

The implementation of the Minigrow Farm model generated both economic and food security benefits for the participating households. During the independent implementation period, participants successfully produced various vegetables, including pak choi, mustard greens, water spinach, and red spinach, as well as eggs from laying hens integrated into the farming system. The vegetables produced were partly consumed by the households and partly sold in the local community, while eggs served as an important source of animal protein and additional income.

The economic benefits of the Minigrow Farm program were evaluated based on income generated from vegetable and egg sales during the implementation period. The income obtained by the four participating households is summarized in Table 1.

Table 1. Income Generated from Minigrow Farm Activities

Source of Income	Production Unit	Income (IDR)
Vegetable sales (pak choi, mustard greens, water spinach, red spinach)	4 households	3,066,000
Egg sales	55 laying hens	2,970,000
Total income	-	6,036,000

The economic evaluation showed that vegetable sales generated a total income of IDR 3,066,000 from the four participating households during two production cycles per month. In addition, egg sales from 55 laying hens generated a total income of IDR 2,970,000 per month. Overall, the Minigrow Farm program generated an additional income of IDR 6,036,000 for the participating households. These findings indicate that the utilization of home yards through integrated vegetable and poultry production can provide a meaningful contribution to household earnings while reducing food expenditure through self-production of vegetables and eggs.

Beyond the economic benefits, the program also improved household food security by increasing the availability and accessibility of nutritious foods at the family level. The continuous production of fresh vegetables and eggs enabled participating households to diversify their diets and reduce dependence on external food sources, particularly during periods when agricultural activities were disrupted by seasonal flooding. Furthermore, the active involvement of rural women in managing the Minigrow Farm units strengthened their technical skills, entrepreneurial capacity, and decision-making roles in household food production.

The results demonstrate that the Minigrow Farm model is a practical and sustainable approach for improving household food security and increasing family income in rural communities. The successful implementation of the model in Puduk Village suggests its potential for wider adoption in other flood-prone rural areas with similar socioeconomic conditions.

To assess the effectiveness of the training and mentoring activities, participants' knowledge and practical skills related to Minigrow Farm implementation were evaluated using pre-test and post-test assessments. The results of the evaluation are presented in Table 2.

Table 2. Pre-test and Post-test Results on Minigrow Farm Knowledge and Skills

Indicator	Pre-test (%)	Post-test (%)	Increase (%)
Knowledge and skills related to Minigrow Farm implementation	50	85	35

The results presented in Table 2 indicate a substantial improvement in participants' knowledge and skills, increasing from 50% before the intervention to 85% after the completion of the program. This finding demonstrates that the learning-by-doing approach and continuous mentoring effectively enhanced participants' understanding and capacity to independently implement the Minigrow Farm model.

4. Conclusions

The Minigrow Farm program successfully improved household food security and generated additional income for participating families in Puduk Village. The integration of vegetable cultivation and laying hen production transformed underutilized home yards into productive farming areas capable of supplying vegetables and animal protein for household consumption. The program generated a total additional income of IDR 6,036,000 from vegetable and egg sales among the four participating households. Furthermore, the knowledge and skills of Women Farmers Group (KWT) members regarding integrated farming practices increased substantially, as reflected by the improvement in pre-test and post-test scores from 50% to 85%. These results demonstrate that the Minigrow Farm model is an effective and sustainable approach for strengthening household food security, increasing family income, improving environmental awareness, and enhancing the capacity of rural women in flood-prone areas.

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