

## Empowerment of Harapan Farmer Group through Innovation of Processed Orange Peel Products

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### Abstract

This community service activity was conducted at the Harapan Farmers Group in Jorong Baruah Gunuang, Bukit Barisan District, addressing the challenges of low income and underutilized orange peel waste. The primary objective of this initiative was to enhance the community's income by introducing innovative methods for processing orange peel into economically valuable products, such as candied orange peel, orange jam, orange jelly, and natural pesticides. Additionally, the project aimed to improve knowledge in processing management and the results of the innovation. The methods employed in this activity included counseling, training, and direct assistance to farmer group members. The results demonstrated a significant increase in knowledge, from 42% to 91%, and the development of skills in processing orange peels and orange juice from leftover oranges that were previously sold to middlemen. As a result, several innovative orange-based products were created, along with new business opportunities that hold potential for increasing the group's income. Furthermore, a product brand has been established, and the process of obtaining a PIRT (Indonesian Food and Beverage Safety Certificate) from the Health Office is underway. This community service activity not only addresses environmental issues by utilizing orange peel waste but also provides economic value to the community, offering a sustainable solution to both environmental and economic challenges.

Keywords: empowerment, orange peel products, candied orange, jam from oranges, farmer groups

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### 1. Introduction

Farming communities in rural areas in general still face various challenges in improving their living standards and income [1], [2]. This is also experienced by the Harapan Farmers Group in Jorong Baruah Gunuang, Bukit Barisan District, Limapuluh Kota Regency, West Sumatra Province, most of whose members depend on agricultural products, including citrus plants[3]. Although citrus production in this region is quite abundant, the use of agricultural products is still limited to the sale of fresh fruit. As a result, the selling value of citrus products is relatively low and does not provide maximum profits for farmers.

Based on data from the Central Statistics Agency (BPS) [4], oranges are one of the horticultural commodities whose production is quite high in Indonesia, including in West Sumatra. However, the price of oranges at the farmer level tends to fluctuate and often harms them, especially during the harvest. In addition, from the process of consumption and distribution of oranges, a large amount of orange peel waste is produced. So far, the waste has only been disposed of or used on a limited

basis as animal feed, causing environmental problems due to the accumulation of organic waste.

In fact, various studies show that orange peels contain bioactive compounds of high value [5], [6]. Orange peel is rich in pectin[7],[8] which can be utilized as an ingredient in making jelly or jam; flavonoids and limonoids, which have antioxidant activity; and essential oils, which have a distinctive flavor and have the potential to be natural vegetable pesticides. Some studies have even proven that orange peel extract is able to inhibit the growth of certain microbes and can be used as a natural food additive. This shows that orange peels are not just waste, but have great potential to be processed into products with high economic value.

In various regions, the use of orange peels has been developed into various products such as sweets, jams, candies, and herbal[9], [10], [11] cosmetics. However, in Jorong Baruah Gunuang, this potential is not widely known and utilized by farmers. Low knowledge, skills, and access to information are the main obstacles for farmer groups in developing businesses based on local product innovation. Therefore, there is a need for intervention in the form of a community service

program that focuses on empowering farmer groups through training in processing orange peels and orange juice.

Innovation in processing orange peel into products with economic value can be one of the solutions to increase people's income. Some of the products that can be developed include candied orange peels, orange jam, orange jelly, to natural pesticides made from orange peel[12]. These products not only have a selling point, but also answer market trends that increasingly demand healthy, natural, and environmentally friendly food. With the diversification of orange-based products, farming communities can get new business opportunities that are more sustainable, so they do not rely only on the sale of fresh fruit[13].

This community service program is carried out with an empowerment approach, through counseling, training, and direct assistance to members of farmer groups. The concept of empowerment is seen as important because it aims not only to provide technical skills, but also to foster awareness, independence, and motivation for people to develop their own businesses. This activity is expected to be the first step in building a creative economy based on local potential, as well as creating added value from waste that was previously unused.

Thus, this service is directed to: (1) increase the knowledge and skills of the community in processing orange peels into innovative products, (2) create new business opportunities through the diversification of orange-based products, and (3) support the increase in income and welfare of farmer group members in Jorong Baruah Gunuang, Bukit Barisan District.

#### a. Methods

This community service activity was carried out at the Harapan Farmers Group, Jorong Baruah Gunuang, Bukit Barisan District, with a total of XX participants. The main target of the activity is members of farmer groups who are daily active in the orange farming sector.

The implementation method is carried out with a participatory and empowerment approach, so that the community is actively involved in each stage of the activity. The stages of the activity include

##### 1. Socialization and Problem Identification

The activity began with the socialization of the program to members of farmer groups, followed by a discussion to identify the main problems faced, especially related to the low utilization of orange peel waste

##### 2. Counseling and Knowledge Enhancement

Counseling was carried out on the potential of orange peel as a basic ingredient for value-added products, the nutritional content and bioactive compounds in it, as well as market opportunities for orange derivative products

##### 3. Product Manufacturing Training and Demonstration

Members of the farmer group were given practical training on

- Manufacture of candied orange peel
- Making of marmalade
- Making orange jelly
- Making natural pesticides made from orange peels

The training is carried out with a direct demonstration method so that participants can practice each stage of production on their own.

##### 4. Production Assistance

After the training, intensive assistance was carried out in making products so that people's skills improved and were able to produce products that were worth selling.

##### 5. Evaluation and Reflection

Evaluation is carried out through observation of participants' skills, interviews, and group discussions. The success of the program is measured by the ability of participants to produce products independently and the positive response to new business opportunities that arise.

### 3. Results and Discussions

Of the service activities carried out, in accordance with the method, the first is,

#### Socialization and Problem Identification.

At this time we are doing it at the location of the "Harapan" Jorong Baruah Gunuang Farmer Group, Bukit Barisan District, where the activities are as shown in figure 1 below,



Figure 1. Socialization Activities

This socialization was also checked by the knowledge of farmer group members about the issue of oranges, whether they already know the products from orange peels and orange leaves, or orange products from the rest of the sale. Because we already know that with the sale of fresh fruit and oranges, income is less.

The pre-test is carried out before the → counseling/training to find out the extent of the

participants' initial knowledge about the use of orange peels, processing techniques, and business opportunities. Post-tests are carried out after counseling/training → to measure the improvement of participants' knowledge and skills. We can see the table as follows.

**Table 1. Results of Pre-test and Post-test of Farmer Group Members' Knowledge of Processing Orange Peel into Sweets (n = 22)**

No.	Initial Name	Pre-test score (0-100)	Post-test score (0-100)	Upgrade (Post – Pre)
1.	AB	45	87	42
2.	SY	42	85	43
3.	RA	60	90	30
4.	FF	48	91	43
...	....	.....	.....	.....
...	.....	.....	.....	.....
22.	ZA	48	93	45
Average		42	91	47
Average		42%	91%	49

Before socialization, the knowledge level of members was only 42% (low category). Meanwhile, after being told or socialized about orange peel products or orange juice, the knowledge increased to 91%.

**Product Manufacturing Training and Demonstration**

Photos of the training process of some products can be shown from orange peels, as well as from the juice of the orange juice itself, as shown in the following figure 2,



**Figure 2. The process of making jam from orange juice**



**Figure 3. The process of making sweets from orange peel**



**Figure 4. The process of making natural pesticides from orange peels**



**Figure 5. All products that have been made.**

So it can be trained by people who are members of the "Harapan" Farmers Group in Baruah Gunung, Bukit Barisan District, Limapuluh Kota Regency, West Sumatra, so that PIRT permits for candied orange peels, jam from oranges, orange jelly and natural pesticides from orange peels can also be processed

The formation of several innovative orange-based products, as well as the emergence of new business opportunities that have the potential to increase group revenue. Likewise, there is already a brand of the product and is in the process of obtaining a PIRT permit from the Health Office. This service activity proves that the use of orange peel waste not only reduces environmental problems, but is also able to provide economic added value for the community.

**Estimated revenue potential** based on production capacity.

For candied orange peels are as follows,

1 kg of orange peel → become ±500 g of sweets.

Selling price of sweets = IDR 20,000 per 500 g.

If each member (22 people) can process 2 kg of orange peels/week →

1.  $22 \times 2 \text{ kg} = 44 \text{ kg}$  of orange peels → 22 kg of sweets → 44 packs × IDR 20,000 = IDR 880,000/week.
2. In a month →  $\text{IDR } 880,000 \times 4 = \text{IDR } 3,520,000$  additional group income.

The results of the service showed that there was an increase in income for members of the farmer group after being given training in processing orange peels. Before the activity, orange peels were considered waste and did not provide economic value. After being processed into natural sweets, jams, jellies, and pesticides, the product can be sold in the local market with prices varying between IDR 15,000 – IDR 30,000 per package. The average income of farmer group members increased by around 40-60% compared to before. This proves that the use of citrus waste can make a real contribution to the welfare of the community."

#### 4. Conclusions

Community service at the Harapan Farmers Group in Baruah Gunuang, Bukit Barisan District, successfully enhanced the members' understanding of utilizing orange peel waste, as evidenced by a significant increase in the average post-test score to 91%, compared to the pre-test score of 42%. Through the training provided, orange peels, once considered waste, are now transformed into valuable products such as natural sweets, jams, jellies, and pesticides. This innovation not only reduces environmental waste but also provides a sustainable solution for improving farmers' income. While quantitative data on income improvements is still limited, the community's positive response and the promising production potential simulations indicate significant economic opportunities. These outcomes demonstrate that the initiative offers both immediate and long-term benefits, making it essential to expand and sustain similar activities. By doing so, it will have a greater impact on improving the welfare and fostering economic independence in the community, creating a

model that can be replicated in other areas facing similar challenges.

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