

## Innovation in the Utilization of Lemon for Phytonutrient Products as an Effort to Increase Income Generation for the Bocek Village Community

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**Abstract:** Bocek Village is one of the villages in Karangploso District, Malang Regency, East Java Province, which has lemon production reaching 30 tons per month but is not supported by good sales management. Lemon (*Citrus lemon*) is one of the species of the genus citrus, and it has many benefits, such as anti-inflammatory, antimicrobial, anticancer, and antiparasitic activities. This community service aims to create innovative lemon-based products for phytonutrients to increase income generation for Bocek village, Karangploso district, Malang regency. The method used is ABCD (Asset Based Community Development). The activity was carried out on August 19 2023, in Bocek village, Karangploso district, Malang regency, with the participation of 30 housewives. The results of the activity were successful socialization and demonstrations of lemon slice and lemon squash products that were successfully made, and there were levels of public understanding with good (60%), sufficient (23%), and poor (17%) percentages. So, it can be concluded that training activities on using lemons for phytonutrient products can increase public knowledge and generate income in the future.

**Keywords:** ABCD; bocek village; generating income; lemon; phytonutrient

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### INTRODUCTION

Bocek Village is one of the villages in the Karangploso District, Malang Regency, East Java Province, comprising six hamlets: Krajan, Manggesari, Karanglo, Supiturang, Jambon, and Maris. The village area, covering nearly 1,478,741 hectares of black soil, is predominantly utilized for agriculture, covering 130,991 hectares and plantations covering 12,350 hectares. Based on village administrative data in 2009, nearly 8,000 inhabitants

were living in and inhabiting the Bocek Village area, with 55% of them in the productive age group, capable of developing and managing natural resources very well. With a village area suitable for agriculture and plantations, 2,114 villagers became farmers (Arisandi et al., 2022). Besides farming, some also work in the service or trade sectors, such as government services with 87 individuals, trading services with 20 individuals, transportation services with

23 individuals, skills services with 13 individuals, and other services.

Farming and plantations are the main potentials of the Bocek village communities (Irianto et al., 2020; Junaidi & Riyanto, 2017; Utari et al., 2019). Lemon production in Bocek village reaches 30 tons per month with a selling price of 2000-5000/kg. However, this abundant harvest production does not align with its sales management, as 54% of lemon harvests are not absorbed by the market due to farmers only selling to one middleman, accumulating lemons. Furthermore, farmers typically only sell lemons in fresh form, leading to relatively low-profit margins.

Lemon (*Citrus lemon*) is one of the species of the citrus genus that has many benefits in the pharmaceutical, cosmetic, and healthy food fields, and it is rich in phytonutrients. Metabolomic research

and biological activity show that citrus lemon has several significant pharmacological activities. The significant pharmacological activities of lemon are derived from its high phenolic content, especially flavonoids (diosmin, hesperidin, limo citrin) and phenolic acids (ferulic acid, sinapic acid, p-hydroxy benzoic acid). Lemon is also rich in essential oils of monoterpenoids such as D-limonene,  $\beta$ -pinene, and  $\gamma$ -terpinene. The therapeutic activities of lemon, recently scientifically proven, include anti-inflammatory, antimicrobial, anticancer, and antiparasitic activities (Dewi & Mutoharoh, 2021; Dharmago et al., 2017; Klimek-szczykutowicz et al., 2020; septiani et al., 2024). The following is the phytonutrient content of lemons per 100 grams as shown in Table 1.

Table 1 Phytonutrient content of lemon per 100 grams

Composition	Amount	Percentage (%)
Energy	121 KJ	29kkal
Carbohydrates	9.32 g	
Zinc	0,06 mg	1%
Calcium	26 mg	3%
Potassium	138 mg	3%
Magnesium	8 mg	2%
Iron	0,6 mg	5%
Phosphorus	16 mg	2%
Protein	1,10 g	
Vit B2	0,020 mg	1%
Vit B1	0,04 mg	3%
Vit B5	0,19 mg	4%
Vit itC	53 mg	88%
Vit B6	0,08	6%
Vit B3	0,100	1%
Folic Acid	11 ug	3%

Source: Rafiq et al. (2018)

Considering the potential of the Bocek village community and the benefits of lemon, this greatly supports the utilization of lemon for phytonutrient products that are beneficial for health and enhance the community's creativity in processing food commodities, especially functional food innovations. The

innovation undertaken is to process lemon into flagship products, in this case, "lemon slice and lemon squash," thus adding economic value as an alternative for sales. This community service aims to create innovation in lemon-based products to increase village income generation and serve as a mechanism for

empowerment.

## **METHOD**

This community service activity utilizes the Asset Based Community Development (ABCD) method, which is an approach based on assets, strengths, and existing potentials by analyzing the existing problems within a group through community service programs in training for making lemon slices and lemon squash (Selasi et al., 2021). The community service was conducted on August 19, 2023, in Bocek village, Karangploso district, Malang regency, with the participation of 30 housewives. Data collection techniques were based on observation results, interviews, and documentation. Observations and interviews were conducted by directly observing the conditions of the Bocek village community, especially housewives and entrepreneurs. Meanwhile, documentation was obtained from the Bocek village profile, along with activity photos that support the analysis of the results of this activity.

## **RESULTS AND DISCUSSION**

The asset-based approach with the ABCD method helps to observe and analyze the internal conditions within a community group and the possible changes that can be made, where this approach refers to three periods of life: the past, the present, and the future (Rinawati et al., 2022). The implementation of the ABCD method is carried out with the presence of facilitators in the community who play a crucial role in promoting self-reliance and improving the quality of community income. The following are the stages of implementation of community service activities.

### **Planning**

Planning is carried out using the ABCD method before the activity takes place. It

involves conducting observations and preparing work programs.

1. Observation: conducted on the housewives of Bocek village by observing the situation and conditions such as age, occupation, and economic status. The participants' ages range from 25 to 60, within the productive age group (15-64 years). Productive age supports understanding information received and potential information development in the future (Fitriyani et al., 2023). Occupations are assessed based on daily habits such as farming and gardening, which involve having orchards or frequently utilizing lemon. Meanwhile, economic status is selected from individuals with moderate to lower-middle economic status to develop income-generating potential in the future after the activity implementation.
2. Work Program: Work programs or activities are prepared in a non-physical form, such as training in making lemon slices and lemon squash to increase community income.

### **Implementation**

Activities are implemented through several stages, including socialization, product demonstration, and health checks.

1. Socialization: Explain the meaning of lemon slice and lemon squash along with the reasons for utilizing lemon. In this stage, the emphasis is on the health benefits of lemon so that the community realizes the importance of lemon utilization and future sales opportunities. The significant health benefits of lemon in maintaining body health are highlighted because it contains high levels of vitamin C, antioxidants, anti-inflammatory properties, and detoxification of the body from free

radical compounds (Sari & Haflin, 2021). Lemon also contains many natural chemical components, including phenolic compounds such as flavonoids and other nutrients (vitamins, minerals, fibre, essential oils, and carotenoids). Flavonoid compounds prevent hyperglycemia, diabetes mellitus, obesity, hypertension, and cardiovascular diseases (Permatasari et al., 2019).

2. Product demonstration: carried out by practising making lemon slices and lemon squash. Making lemon slices is very easy, just by thoroughly washing the lemon, slicing it thinly to a thickness of approximately  $\pm 3$ mm, and drying it in a dehydrator at a temperature of 60-80°C for 5 hours or the community can use sunlight as an alternative for drying. Furthermore, making lemon squash is done through several steps, including:

- Thoroughly washing the lemon.
- Squeezing the lemon
- Putting enough ice cubes into the glass
- Adding enough sugar water into the glass
- Adding the squeezed lemon
- Adding enough basil seeds
- Adding 3-4 lemon slices
- Adding enough water
- Adding soda as desired (optional)

The process of making lemon slices can be seen at the link: <https://youtube.com/shorts/knRNf4O9Y1w?feature=shared>. The process of making lemon squash can be seen at the link:

[https://youtube.com/shorts/xi0CuBT\\_n0c?feature=shared](https://youtube.com/shorts/xi0CuBT_n0c?feature=shared).

Documentation of the implementation of service activities and the products produced are shown in Figure 1.



Figure 1 (a) Socialization and product demonstration, (b) Group photo with the product results, and (c) Photos of lemon slice and lemon squash products

### Evaluation

The evaluation form of this activity used a post-test design to measure the community's level of knowledge about using lemons for health and income improvement after the activity. The results of the participants' knowledge level are shown in Table 2.

Table 2 Participants' knowledge level after the activity

Knowledge Level Category	Post-Test Result	
	N	%
Good (76-100%)	18	60
Fair (56-75%)	7	23.3
Poor (0-55%)	5	16.7
<b>Total</b>	<b>30</b>	<b>100</b>

Based on the Table 2, the results are obtained with a percentage of good (60%), fair (23.3%), and poor (16.7%). The level of good knowledge is measured on a scale of 76-100%, then the level of fair knowledge is 55-75%, and the level of poor knowledge is <55% from the results of answering the post-test questions out of 10 (Agustikawati et al., 2021). Thus, based on this, the community can understand the socialization and product demonstration of lemon. In addition, the evaluation of activities is also carried out by measuring the community's response to the following factors:

1. Supporting Factors

The activity method uses a simple and easily understood approach. In addition, the materials used are assets or local community potentials, making them implementable. The materials used are easily found in households, so the community can develop them sustainably for community income generation or consume them independently in an effort to maintain health from local products.

2. Inhibiting Factors

The main obstacle to using lemons is that in Bocek village, they are widespread among the community but still need to be well-utilized and only sold as fresh lemons rather than processed products.

3. Efforts to Overcome Barriers

Training in making lemon slices and squash will increase the community's creativity in processing lemons to be sold independently and increase community income. In addition, the community is also provided with training products with packaging accompanied by materials and methods for practice at home.

## CONCLUSION

Based on the results of community

service activities in the form of training on using lemons to produce lemon slices and lemon squash in Bocek village, Karangploso district, Malang regency, it can be concluded that with the ABCD method, the community is aware of the lemon's assets or local potential for phytonutrient products that can increase community income or revenue. The follow-up to this activity is coordination and cooperation with village officials to monitor the realization of the comprehensive and sustainable processing of local commodities, especially lemons.

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