



Efforts to increase the added value of belimbing wuluh in Triwungan Village, Kotaanyar District, Probolinggo Regency

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ARTICLE INFO	ABSTRACT
Article history Received: 2025-05-23 Revised: 2025-08-12 Accepted: 2025-08-26 Published: 2025-08-26 Keywords Belimbing wuluh Entrepreneurship Value-added Women empowerment	<i>Belimbing wuluh (Averrhoa bilimbi L.) is a fruit plant with multiple uses as a food ingredient, traditional medicine, and raw material for processed food products. Despite its abundance in Triwungan Village, Kotaanyar District, Probolinggo Regency, its economic potential remains underutilized due to the lack of knowledge and skills in value-added processing. This community service project aimed to empower local Family Welfare Movement (Pemberdayaan dan Kesejahteraan Keluarga/PKK) women's groups through training in processing belimbing wuluh into candied fruit and syrup. The program employed socialization, hands-on workshops, application of simple technology, and evaluation. Results showed that participants successfully produced processed products, gained practical skills, and demonstrated high enthusiasm, with 85% expressing motivation to develop independent micro-enterprises. The activity highlights the importance of community-based training to foster women's empowerment, resource utilization, and rural entrepreneurship.</i>
Kata Kunci Belimbing wuluh Kewiraswastaan Nilai tambah Pemberdayaan perempuan	Upaya peningkatan nilai tambah belimbing wuluh di Desa Triwungan Kecamatan Kotaanyar Kabupaten Probolinggo. Belimbing wuluh (<i>Averrhoa bilimbi L.</i>) merupakan tanaman buah dengan beragam kegunaan sebagai bahan pangan, obat tradisional, dan bahan baku produk pangan olahan. Meskipun melimpah di Desa Triwungan, Kecamatan Kotaanyar, Kabupaten Probolinggo, potensi ekonominya masih belum dimanfaatkan secara optimal karena kurangnya pengetahuan dan keterampilan dalam pengolahan yang bernilai tambah. Proyek pengabdian masyarakat ini bertujuan untuk memberdayakan kelompok perempuan Gerakan Kesejahteraan Keluarga (PKK) setempat melalui pelatihan pengolahan belimbing wuluh menjadi manisan buah dan sirup. Program ini menggunakan sosialisasi, lokakarya langsung, penerapan teknologi sederhana, dan evaluasi. Hasil menunjukkan bahwa peserta berhasil menghasilkan produk olahan, memperoleh keterampilan praktis, dan menunjukkan antusiasme yang tinggi, dengan 85% menyatakan motivasi untuk mengembangkan usaha mikro mandiri. Kegiatan ini menyoroti pentingnya pelatihan berbasis masyarakat untuk mendorong pemberdayaan perempuan, pemanfaatan sumber daya, dan kewirausahaan pedesaan
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INTRODUCTION

Belimbing wuluh (*Averrhoa bilimbi L.*) is a fruit-bearing tree commonly found in home gardens across Indonesia, both in lowland and highland areas. Traditionally, its sour fruits are used as food ingredients, while its flowers are utilized in traditional medicine, particularly as remedies for cough in children (Alhassan & Ahmed, 2016; Dewi et al., 2019). However, in modern households, particularly urban areas, the role of belimbing wuluh in daily life is declining, replaced by instant food products and industrial medicines (Abdullah & Munadirah, 2021; Insan et al., 2019; Santosa et al., 2021).

In rural settings, including Triwungan Village, belimbing wuluh continues to grow abundantly but is often left unutilized (Octariani et al., 2021). A preliminary survey revealed that large quantities of fallen fruits were wasted, rotting in home yards, and even creating sanitation problems. Farmers and households rarely sold them, and if sold, prices were extremely low, reducing economic incentives. This situation reflected a mismatch between resource availability and community capacity to utilize it (Akpan & Zikos, 2023; Hayden et al., 2021; Ogawa et al., 2023; Pawlak & Kołodziejczak, 2020; Piñeiro et al., 2020).

Several previous studies have explored the potential of belimbing wuluh processing into candied fruit, herbal beverages, or other diversified products (Abidin et al., 2017; Insan et al., 2019). However, these initiatives were often fragmented, without a systematic training model, entrepreneurship orientation, or community-based sustainability strategies. This reveals a knowledge and practice gap in rural households regarding the economic optimization of local resources.

Therefore, this program was designed to: (1) educate the PKK women's group in Triwungan Village on the economic and health potential of belimbing wuluh; (2) train participants in processing belimbing wuluh into candied fruit and syrup using simple and low-cost technology; and (3) encourage entrepreneurship and micro-enterprise initiatives through local product development.

The contribution of this program is twofold: (1) enhancing community skills and knowledge to reduce agricultural waste and increase household income; and (2) strengthening women's empowerment and rural entrepreneurship through the utilization of locally available resources.

METHOD

This community service program was implemented in Triwungan Village, Kotaanyar District, Probolinggo Regency, for a duration of eight months. Participants consisted of 20 PKK members (housewives), selected because they represent the most active women's group in the village.

Stages of Activities

1. Socialization and Counseling: Provided through presentations, interactive discussions, and visual aids. Topics included: nutritional and medicinal benefits of belimbing wuluh, economic opportunities, and value-added processing.
2. Training and Practice: Hands-on workshops on candied fruit and syrup processing with step-by-step guidance.
3. Evaluation and Sustainability: Knowledge and skills were measured using pre-test and post-test questionnaires. Discussions were held to explore sustainability strategies, such as cooperative-based marketing and digital promotion.

RESULTS AND DISCUSSION

Community Context and Engagement

Triwungan Village, located in Kotaanyar District of Probolinggo Regency, is characterized by an agrarian economy with smallholder farming as the main livelihood. Women play crucial roles not only in household management but also in community-based organizations such as PKK. PKK activities traditionally include health campaigns, nutrition improvement, and family economics, yet the integration of agribusiness innovation has been limited.

During the preliminary survey, it was evident that belimbing wuluh trees grew abundantly in almost every household yard. However, the fruits were mostly wasted. Local women reported that they rarely sold or processed the fruits, as knowledge of preservation methods was absent. Some households occasionally used the fruit for cooking, but large surpluses were discarded. This situation reflected an untapped potential resource that could be mobilized for women's entrepreneurship.

Community response to the program was strong. From the beginning of the socialization session, participants engaged in discussions and asked practical questions regarding packaging, taste quality, and marketing. This enthusiasm indicated that the community recognized the economic opportunity once it was introduced to them. Such engagement mirrors findings by Faizah et al. (2022) who reported that rural women are highly receptive to processing training when the materials are simple, affordable, and directly applicable to their daily context.



Figure 1. Socialization of Activities for PKK Mothers in Triwungan Village

Training Outcomes: Candied Belimbing Wuluh

The first product introduced was candied belimbing wuluh. Participants learned step-by-step techniques, including cleaning, soaking in lime solution, boiling, sugar infusion, and drying. The training emphasized food safety, hygiene practices, and consistency in taste.

Participants highlighted several challenges during practice: (1) Controlling the sourness of the fruit, which required precise sugar concentration. (2) Ensuring the drying process produced a chewy but not overly hardened texture. (3) Maintaining cleanliness to avoid contamination, especially given humid weather conditions.

The candied product was well received during taste testing, with participants agreeing it had good potential as a packaged snack. This is consistent with Agustina et al. (2024), who found that diversifying traditional sour fruits into candied products increased market acceptance, especially when packaging was improved.

Importantly, participants realized that candied fruit had a longer shelf life than fresh fruit, which not only reduced waste but also allowed products to be sold outside immediate harvest seasons. This aligns with value-added processing principles in rural agribusiness, where shelf-life extension directly correlates with increased market opportunities.



Figure 2. The practice of making candied Belimbing Wuluh

Training Outcomes: Belimbing Wuluh Syrup

The second product was syrup. The training demonstrated blending, filtering, boiling with sugar and pandan leaves, and bottling into sterilized containers. Syrup production was perceived as more challenging than candying because it required balancing taste, achieving proper viscosity, and maintaining sterilization for safe storage.

Participants noted that syrup was attractive for several reasons: (1) It could be consumed as a refreshing drink, popular among children. (2) It could be packaged in bottles for local markets and festive events. (3) It allowed the incorporation of additional flavors (ginger, cinnamon) for product diversification.

Compared to candied fruit, syrup was perceived as more marketable in the short term due to easier consumption. However, participants expressed concerns about bottling and branding, acknowledging the need for additional training in labeling, packaging design, and shelf-life testing. These concerns reflect broader challenges in rural micro-enterprises, where product development often outpaces marketing readiness.



Figure 3. Practice of making belimbing wuluh syrup

Knowledge and Skills Improvement

Pre- and post-test evaluations showed significant improvement. Prior to training, only 25% of participants reported knowledge of fruit processing beyond traditional cooking. After training, 95% could describe the steps of both candied fruit and syrup production, while 85% expressed interest in continuing production for income generation.

This change demonstrates the effectiveness of participatory, hands-on methods in adult learning. Rather than relying solely on lectures, the training emphasized “learning by doing,” which is consistent with constructivist approaches to community empowerment. The findings support Ibrahim (2008), who argued that sustainable community development requires active participation and skill ownership rather than passive reception of knowledge.

Empowerment through PKK Groups

One of the strategic aspects of this program was channeling activities through the PKK women’s group. PKK functions as a stable, community-based structure with experience in collective action, making it an ideal partner for sustainability.

By empowering PKK members, the program achieved: (1) Collective capacity building, where women supported each other during training. (2) Peer-to-peer knowledge transfer, as participants committed to sharing skills with neighbors not directly involved. (3) Potential cooperative entrepreneurship, since PKK already has a framework for collective savings and small-scale business activities.

This aligns with gender and development (GAD) perspectives that emphasize empowering women as economic agents leads to broader family and community welfare improvements. Previous studies (Meriatna et al., 2022) also confirm that women’s groups, when trained in food processing, often become pioneers of rural micro-enterprises.

Comparative Discussion with Previous Studies

The outcomes of this program resonate with multiple earlier initiatives: Faizah et al. (2022) demonstrated successful community training on belimbing wuluh candied fruit in Jombang, though their work lacked entrepreneurship follow-up. Agustina et al. (2024) highlighted the health and diversification potential of candied belimbing wuluh, but did not address sustainability or packaging. Meriatna et al. (2022) explored belimbing wuluh dodol in Aceh, which empowered women but required strong market linkages for sustainability.

Compared with these, the current program integrated both skill transfer and entrepreneurship orientation, offering a more holistic approach. This novelty underscores the academic contribution of the program: demonstrating that simple, low-cost technologies, when embedded in women's groups, can yield both social and economic impacts.

Broader Implications

The program has broader implications beyond the village context: (1) Economic Sustainability. Value-added products increase household income and reduce reliance on unstable agricultural markets. (2) Social Empowerment. Women's active participation enhances their decision-making power within households and communities, aligning with SDG 5 (Gender Equality). (3) Environmental Benefits. Utilizing surplus fruits reduces organic waste, improving household hygiene and contributing to environmental sustainability. (4) Policy Relevance. The initiative can be scaled through government or NGO programs focused on rural entrepreneurship, food security, and women's empowerment.

By linking community empowerment with national goals such as SDGs and local economic development strategies, this project contributes to both practical and policy-level discussions.

CONCLUSION

This community service program successfully enhanced the knowledge and skills of PKK women in Triwungan Village to process belimbing wuluh into candied fruit and syrup. Participants demonstrated high enthusiasm, improved practical skills, and motivation to pursue micro-enterprises. The program addressed resource wastage and economic underutilization, showing that simple, appropriate technology can transform local potentials into sustainable economic opportunities.

Future initiatives should focus on: (1) strengthening product packaging, branding, and marketing strategies; (2) establishing cooperative business models through PKK; (3) partnering with local government for certification and access to capital; and (4) diversifying products (e.g., herbal drinks, jams) to expand income opportunities.

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