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Extension in Banana Flour Production as an Effort to Diversify Banana-Based Products in Pakuan Village

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Abstract: Pakuan Village, located in Narmada District, boasts an impressive annual banana production of up to 1.62 tons per hectare. Despite this high potential for banana yields, the development of banana-based products remains limited to banana chips and *sale pisang*. One significant challenge MSMEs face in Pakuan Village is the lack of applied food production technology. To address this issue, an initiative has been launched to diversify products by transforming unripe Mas Bali bananas into banana flour. This effort aims to add value to banana products while fostering creativity among MSMEs and enhancing their income through banana-based processed goods. Participants were provided with knowledge about the nutritional benefits of bananas and the proper methods for making and storing banana flour. The attendees included members of the Family Welfare and Empowerment (PKK) and the Pokdarwis (Tourism Awareness Group) of Pakuan. It is hoped that the innovation of processed banana flour from unripe Mas Bali bananas will contribute to developing businesses based on local commodities and create opportunities for market penetration.

Keywords: banana flour; income enhancement; product diversification; Pakuan village; value addition.

Introduction

Bananas are abundant in vitamins such as C, niacin, thiamine, and folic acid. It also contains minerals like iron, sodium, potassium, copper, magnesium, and calcium. In addition to its impressive nutritional profile, bananas are recognized for their numerous beneficial bioactive compounds. Research has shown that bananas provide a rich source of phenolics, volatile compounds, phytosterols, carotenoids, flavonoids, biogenic amines, and dietary fiber, all of which are essential for promoting human health (Mengstu *et al*., 2021). Bananas produce various food items, including jams, jellies, wine, beer, crisps, chips, nectar, sorbets, vinegar, and other fermented drinks. They also serve as a key ingredient in numerous culinary dishes, including desserts, ice creams, pastries, and cream-based products (Anyasi & Maziya-Dixon, 2013).

West Nusa Tenggara (NTB) banana production reached 125,590 tons in 2022 (BPS, 2022). One of the villages with high banana yield potential in NTB is Pakuan Village, Narmada District, West Lombok Regency, with a production of around 1.62 tons/Ha. High banana productivity is not accompanied by diverse banana processing. The selling value of fresh bananas ranges from Rp 5,000.00 - Rp 10,000.00 per bunch; this price will

drop during the harvest season to less than Rp 5,000.00 per bunch. Despite its abundance, the products made from bananas developed and sold are banana chips and *sale pisang*.

In 2023, several community service teams from the Faculty of Food Technology and Agroindustry at the University of Mataram engaged in research and development to improve the quality of banana chips and create innovative banana recipes for *sale pisang*. This community development program was supported by PT. Pertamina Patra Niaga.

In 2024, our team continued this community development initiative to bolster the economic growth of Pakuan Village and build on previous efforts. The focus is on developing banana flour processing skills for MSMEs in Pakuan Village, positioning it as a promising business opportunity. Banana flour is a versatile powdered product made from raw bananas. It is a gluten-free flour rich in fiber and potassium, serving as an excellent source of resistant starch and suitable for paleo and primal diets.

Banana flour can function as an intermediate food product suitable as an ingredient for gluten-free breadmaking (Hosokawa *et al*., 2020), pasta, and noodles. There are two varieties of banana floors: one made from unripe bananas has been utilized as a source of resistant starch in wheat flour (Sarawong *et al*., 2014) and the other from ripe bananas, which are used for nutrient fortification and to enhance sensory qualities in wheat flour (Adubofuor *et al*., 2016; Masih & Desale, 2019). Unripe bananas are often used as uncooked for smoothies or nutrition bars to prevent the reduction of resistant starch content due to cooking.

Banana flour derived from unripe banana varieties has attracted interest from nutrition researchers and dietitians as a valuable and high-quality source of resistant starch (Zhang *et al*., 2005; Anyasi & Maziya-Dixon, 2013). The resistant starch content in banana flour (from unripe bananas) can be either high (>60%) or low (<10%), depending on the flouring process. The nature and characteristics of banana flour depend on the variety of bananas used.

The bananas found in Pakuan Village include Sulawesi, Kepok, and Mas Bali. Mas Bali is the most abundant banana there; in addition to its long-year availability, this type of banana is also cheap. The production of banana flour from Mas Bali banana has potentially significant economic benefits due to its health benefits, taste, and versatility as a food ingredient. To maximize these economic opportunities, efforts will be made to ensure proper packaging, labeling, and storage by standards.

Methods

Extension activities focused on producing banana flour from unripe Mas Bali bananas were held on August 5, 2024, in Pakuan Village, Narmada District, West Lombok Regency, NTB. Participants in this extension activity included members of the PKK (Family Welfare Movement) and the *Pokdarwis* (Tourism Awareness Group) Pakuan, totaling 23 participants. This extension activity was conducted in three stages:

1. An initial survey of banana potential and the development of banana products undertaken by the Pakuan community.
2. An extension session featuring informational materials on banana flour's nutritional content, the process of making banana flour, and how to store it.
3. A quick practice of making unripe banana flour from Mas Bali banana.

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Result and Discussion

This community service activity aims to highlight the potential for developing banana flour products made from the unripe fruit of Mas Bali bananas. The primary objective of this program is to address the lack of innovation in banana-based products in Pakuan Village. Through training on making banana flour, the goal is to inspire MSMEs to explore product development opportunities and recognize promising business potential since banana flour can be used as a flour substitute.

In the initial stage, the community service team conducted a preliminary study, including communication activities with relevant stakeholders and field visits to the location. They communicated with Pakuan Village officials and the Pokdarwis (Tourism Awareness Group) to ensure the event could be implemented smoothly and effectively.

The main activity involved extending the knowledge of how to make banana flour. It was followed by showing unripe banana flour, cookies

made from 100% flour, and cookies made from banana flour and flour. To measure participants' understanding, they were given time to ask and also asked questions about what they had learned. Each participant received a booklet about banana flour during the event, as shown in Figure 1.

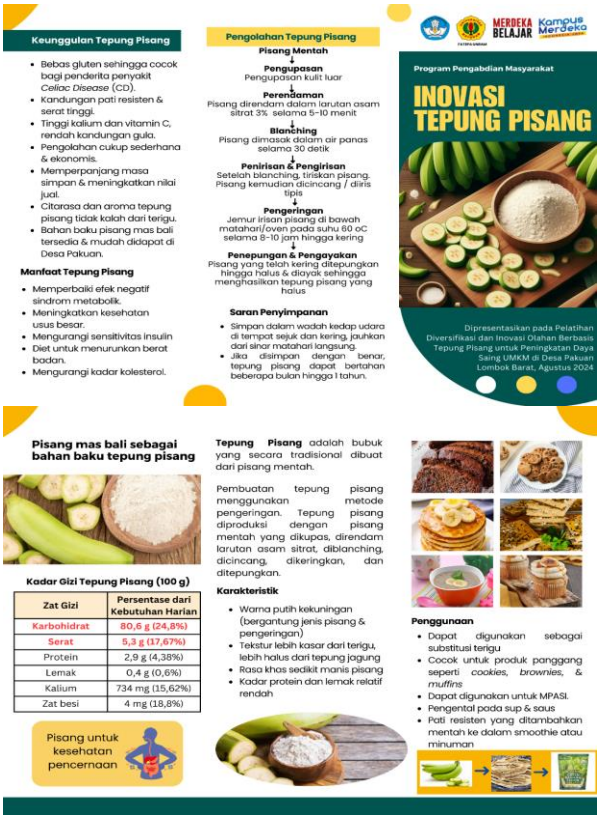

Figure 1. Booklet of Banana Flour

Making banana flour includes peeling, soaking in citric acid solution, blanching, draining and slicing, drying, flouring and sieving, and packaging. Raw materials used are unripe Mas Bali bananas free from pests and diseases. Soaking is done for 10-15 minutes to remove sap, followed by blanching for 30 s' to maintain the color of the banana and prevent oxidation. Mas Bali bananas are shredded using a shredder, followed by drying in the sun for ±30 hours, depending on the weather. Dried unripe banana is ground into flour using a blender or disc mill, continued with sieving, and packaged in plastic. Since the process is rather long and requires long time for drying, the participants were shown the final product of unripe banana flour, as shown in Figure 2.

Figure 2. Unripe banana flour made from Mas Bali banana

The event's success was proven by the enthusiasm of the participants proved the event's success, as they engaged in the activities until the end (see Figure 3). During the question-and-answer and sharing sessions, participants shared their thoughts about substituting flour with unripe banana flour to make traditional cakes and snacks.

Figure 3. The participants of the event

Most participants were young mothers open to pursuing opportunities to develop products made of unripe banana flour. They are inspired to bake cookies and cakes after seeing the cookies made of flour only and cookies made of unripe banana flour and flour (see Figure 4).

Figure 4. Cookies made of 100% flour (the light one) and cookies made of 50:50 unripe banana flour & flour

It is hoped that through this banana flour production extension, the participants will become more aware of the importance of having skills in product processing and innovation with bananas. Participants are encouraged to explore the development of banana flour and its derivative products and to consider existing business opportunities. Furthermore, banana flour and products made from it can be further developed into specialty products of Pakuan Tourism Village, becoming an iconic food product.

Conclusion

Extention on making unripe banana flour from the fruit of Mas Bali bananas is expected to provide insight and knowledge about banana flour-making skills. Through this activity, several things were achieved:

1) Participants learned that unripe bananas can be processed into banana flour
2) Participants learned the simple procedure for making banana flour and had the ability to produce banana flour
3) Participants became more aware of the potential for product development from banana flour as ingredient that can be used as flour substitute

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