SPEKTA
(Jurnal Pengabdian Kepada Masyarakat: Teknologi dan Aplikasi)
ISSN 2723-8016 (online) | 2723-8008 (print)
Vol 6, No. 1, pp. 108-121

Empowerment of Communities Through the Production of Functional Sorghum-based Food in Langung Village, West Aceh

Dewi Andriani [1*], Nafisah Eka Putri [1], Suci Eka Putri [2], Jekki Irawan [1], Mawaddah Putri Arisma [1], Rizki Agam Syahputra [3], Riza Ulhaq [3], Rachmatika Lestari [4], Yasrizal [5]

[1] Faculty of Agriculture, Universitas Teuku Umar, Aceh, Indonesia
[2] Faculty of Public Health, Universitas Teuku Umar, Aceh, Indonesia
[3] Faculty of Engineering, Universitas Teuku Umar, Aceh, Indonesia
[4] Faculty of Law, Universitas Teuku Umar, Aceh, Indonesia
[5] Faculty of Economics, Universitas Teuku Umar, Aceh, Indonesia
*Corresponding Author: dewiandriani@utu.ac.id

ARTICLE INFO

Article history
Received December 6, 2024
Revised April 25, 2025
Accepted May 5, 2025

Keywords
Cookies;
Eggroll;
Sorghum.

ABSTRACT

Background: This innovation aims to enhance the skills members and support nutritional improvement efforts to prevent stunting in the area. The program also includes training in packaging and product branding to increase the competitiveness and market in local markets**.**
Contribution: Sorghum is being promoted as an alternative food source due to its nutritional content, which can help regulate blood sugar levels and prevent stunting in the community.
Method: The methods used included community education, mentoring, and community development. The stages of the activity consisted of socialization, training on sorghum-based food products, product packaging and branding, data collection, and evaluations.
Results: The results of the sorghum flour cookie processing showed that 80% of respondents stated the taste was delicious, and 72% said the eggroll product was delicious.
Conclusion: This activity has a positive impact on product diversification for the partners and is expected to be sustainable for community empowerment. Sustainability is supported through mentoring, the development of SOPs, partnerships and community-based business units, as well as the role of local policies in strengthening agriculture.

1. Introduction

Sorghum is a plant that can be used for food, feed, and bioenergy (bioethanol) and can adapt to marginal land [1], [2]. Sorghum is a functional and nutritious food that is superior to wheat flour, wheat, and red beans, and has the potential to support global food supply diversification in addressing food crises caused by climate change [3]. Sorghum processed into rice has a nutritional composition of 75.19% carbohydrates, 15.50% protein, 1.19% fat, 373.52 kcal/100g of energy, 12.14% total fiber, and an antioxidant capacity of 113.93 mg of vitamin C/100g [4]. Sorghum is also gluten-free, making it suitable for individuals with celiac disease and autism [5]. According to research before, that cookies made from sorghum flour contain 49.9% carbohydrates, 5.69% protein, 25.2% fat, and have strong antioxidants that can combat free radicals and support overall health [6].

Langung Village is one of the villages located in Meureubo District, West Aceh Regency, Aceh Province, Indonesia. The village covers an area of 420 hectares, and most of its residents work as farmers, while others are fishers or traders. Farming activities in the village include rice, corn, or legumes, while plantation activities include oil palm and coconut farming. This indicates a lack of local food diversification. Given the village's agricultural potential, there is still ample land that can be used to promote food diversification through the development of a sorghum-based agroindustry, which could improve both local nutrition and national food security. The introduction of sorghum cultivation in Langung Village will implement technological interventions that include the use of superior seeds that are adaptive to local climatic conditions, environmentally friendly cultivation techniques, and the use of agricultural tools.

Another issue faced by Aceh Province is the high prevalence of stunting among children. In 2021, the province reported 33,021 stunting cases, representing 37% of the total number of children, higher than the national prevalence [7]. Aceh ranks third in Indonesia in terms of stunting prevalence among children under five years old [8]. To reduce the incidence of stunting, it is essential for parents to provide nutritious food for their children. One solution is to innovate in the field of local food, such as sorghum, which can be developed into various nutritious, affordable, and popular food products [9]. Several studies have developed sorghum-based food products, such as sorghum churros [9], sorghum cookies [10], sorghum cornflakes and sorghum muffins [10], among others. Based on previous research [11], the carbohydrate content analysis of sorghum biscuits shows 52.98%, exceeding the SNI standard limit (<30%). The development of high-protein biscuits based on sorghum flour is an innovation in creating local food-based snacks for toddlers to address stunting.

In connection with improving community nutrition through functional food products, Langung Village has the potential to process this agro-business. This is because the village has several shops that sell traditional West Aceh cakes. These businesses are usually run by families and passed down through generations, evolving into small and medium-sized enterprises

(SMEs) that employ local people. This highlights the potential for utilizing the community's basic skills in processing various types of food. One such micro-business is run by the Cempaka Women's Farmers Group (KWT) in Langung Village, West Aceh.

The Cempaka Women's Farmers Group (KWT) has been involved in the production of traditional West Aceh cakes. KWT Cempaka was established in 1998 but only began producing traditional West Aceh cakes in 2017. To date, their production has not reached its full potential, lacking innovation and product diversity in the West Aceh cake market. In terms of marketing, there is no attractive packaging or branding, as products are still packaged in clear plastic with a simple rubber tie. These challenges indicate the need for training and assistance for KWT Cempaka members. A proposed solution includes improving entrepreneurship skills, enhancing product quality and quantity, diversifying sorghum-based products, and developing branding and nutritional information to increase the product's appeal and market reach.

The urgency of this study stems from the multidimensional challenges facing rural communities in Indonesia, particularly in Aceh Province, which is burdened with one of the highest rates of stunting among children in the country. Despite having significant agricultural potential, Langung Village lacks food diversification and innovation in local agroindustry development. The prevalence of stunting, coupled with limited access to functional and nutritious foods, demands immediate intervention that leverages locally available resources. Sorghum, as a drought-resistant, nutrient-rich crop, presents a strategic solution to address food insecurity, poor dietary diversity, and economic stagnation at the village level. By focusing on sorghum-based product development and empowering local women's groups, this study aims to generate sustainable food innovation that directly contributes to improving child nutrition, strengthening household economies, and building community resilience in the face of climate change and socio-economic disparities.

This study contributes to the discourse on community-based agroinnovation by demonstrating a replicable model of sorghum utilization in rural food processing and entrepreneurship. It bridges the gap between agricultural potential and nutrition-sensitive development through the empowerment of local actors, particularly women. The research offers practical insights into how traditional micro-businesses can be transformed into productive, health-oriented enterprises through targeted training in food processing, packaging, branding, and business management. The study also supports national efforts toward stunting prevention and local food system diversification by providing a functional food alternative that is both culturally acceptable and nutritionally beneficial. Furthermore, the participatory methodology employed in this research serves as a model for inclusive development programs that integrate agricultural extension, health promotion, and rural entrepreneurship.

The purpose of this community service activity is to empower the community to increase food diversity and sorghum-based processed products to enrich product variations and improve community nutrition, particularly in efforts to prevent stunting in children.

https://doi.org/10.12928/spekta.v6i1.12149

Additionally, training on product packaging and branding was provided to increase consumer interest and expand marketing reach.

2. Method

This community service activity took place in Langung Village, Meurebo District, West Aceh Regency, Aceh Province. The activity was carried out using several methods, including socialization on sorghum cultivation and its nutritional benefits, training on sorghum-based food production, and training on packaging and branding of products. The stages of these activities are explained as follows:

2.1. Socialization of Sorghum Cultivation and Sorghum Nutrition

This community service method involved socializing the techniques of sorghum cultivation and the nutritional value it contains to the community. The goal of the sorghum cultivation socialization was to introduce cultivation techniques suitable for the local conditions and educate participants about sorghum's potential as a nutritious and marketable food commodity. Various presentation materials such as leaflets, images, video educatif with powerpoint slides were used to facilitate participants understanding, along with a discussion session to identify potential issues. Additionally, the socialization of the nutritional benefits of sorghum aimed to inform participants about the superior nutritional content of sorghum compared to wheat and rice, as well as its role in addressing nutritional issues like stunting [12], [13]. This educational approach is expected to increase public understanding of the importance of consuming nutritious sorghum-based foods, particularly in efforts to improve the nutritional status of children.

2.2. Training on Sorghum-Based Food Production

The sorghum-based food production training activities focused on making processed cookies and eggrolls, where participants were equipped with practical steps in processing techniques, including how to maintain the quality of product flavor and texture. This training was guided by the head of the farmer group and carried out with the support of equipment from the program grant, in the form of production-scale toasters and mixers, to support the efficiency and consistency of the final results.

2.3. Packaging and Branding of Products

The training on packaging and branding for sorghum-based cookies and eggrolls taught participants about the importance of attractive packaging design and how to select a product design that aligns with target market characteristics. Participants were trained to understand design elements that can enhance the product's visual appeal, such as color selection, logos, and clear nutritional information. Furthermore, the training educated participants on how making the right design decisions can strengthen brand image, attract consumer attention, create a

positive impression, and increase sales outside of West Aceh.

2.4. Data Collection and Evaluation of Community Service Activities

The data for this community service activity were collected through observation, participant experiences, and direct practice. The data were presented in descriptive form, including image documentation, and evaluated using a questionnaire to measure active participation and assess the extent to which the program positively impacted the community's economic and nutritional status. The evaluation was conducted in two stages: (a) Formative evaluation at the beginning of the activity (after the socialization and training on sorghum-based food production) to gather initial feedback, identify challenges, and adjust the implementation methods to better target the objectives. (b) Summative evaluation at the end of the activity (after the packaging and branding training) to measure the increase in knowledge, skills, and readiness of the participants to develop local sorghum-based food products.

The questionnaire was completed by all 17 members of the women farmers' group. The collected data were then analyzed by calculating the percentages to provide a clearer picture of the distribution or frequency of each category in the questionnaire. The percentage results were then used as the basis for drawing conclusions and offering recommendations for further improvement or development.

3. Results and Discussion

3.1. Socialization of Sorghum Cultivation and Sorghum Nutrition

The community service activities began with a socialization session on sorghum cultivation. This session explained the selection of suitable locations for sorghum to grow well and the soil preparation process, which involves plowing or tilling the soil to loosen it and remove weeds. The soil must be free of any previous crop residues. Additionally, the session discussed the selection of appropriate sorghum varieties based on the climate and soil conditions in West Aceh. This is related to the planting purpose, as different sorghum varieties are used for livestock feed, food products, or biofuel production.

The cultivation socialization also explained the optimal planting time, such as at the beginning of the rainy season or when the soil temperature reaches around 15-20°C. The session also covered how to care for sorghum plants, including watering, fertilization, pest and disease control, weed management, and harvesting. Sorghum is ready to harvest when the grains become hard and reddish-brown in color. Typically, harvesting takes place 3-5 months after planting, depending on the variety. Harvesting can be done by hand on a small scale or with harvesting machinery on a larger scale [14]. The presenter also showed examples of sorghum plants, sorghum grains, sorghum rice, and sorghum flour Figure 1.

The next activity was a socialization session on the nutritional value of sorghum. During this session, it was explained that sorghum is an excellent source of dietary fiber, which contributes to digestive health [15]. Additionally, sorghum is a natural source of antioxidants (flavonoids,

https://doi.org/10.12928/spekta.v6i1.12149

phenolic acids, and tannins) that can help reduce the risk of cancer, diabetes, heart disease, and several neurological diseases, as well as cancer. Sorghum is naturally gluten-free and is an ideal choice for people who avoid gluten, as well as being safe for those with Celiac disease and gluten intolerance. Sorghum flour is also a suitable alternative to wheat-based flour products [16]–[18].

Figure 1. The Socialization of Sorghum Cultivation and Nutrition for Community Health

The session also highlighted that sorghum contains iron, copper, zinc, and magnesium, all of which play a role in improving circulation. Copper helps the body absorb iron more effectively, which can prevent anemia. Having sufficient amounts of iron and copper in the body aids circulation and stimulates cell growth and repair. Iron and copper also help maintain energy levels. Sorghum contains magnesium and calcium, which contribute to bone health. Magnesium enhances calcium absorption in the body, while calcium helps to build strong bones Figure 1.

3.2. Training in sorghum-based food production

After the socialization on sorghum cultivation and nutrition, the activity continued with training on the production of sorghum flour-based food products. This activity involved making cookies and eggrolls using sorghum flour. The ingredients used for making cookies include 1 kg of sorghum flour, 500 grams of powdered sugar, 750 grams of butter, 4 egg yolks, 60 grams of cocoa powder, 40 grams of chocolate milk powder, 40 grams of white milk powder, 1/2 teaspoon of vanilla, cornstarch as needed, finely chopped dark cooking chocolate, and choco chips as needed. The steps to make them are: (1) Mix the eggs, sugar, and butter. Beat with a mixer for about 15 minutes. (2) Add vanilla, cornstarch, cocoa powder, chocolate milk, and white milk to the mixture, while mixing at a low speed. (3) Gradually add sorghum flour into the mixture while stirring and mixing with a spatula. (4) Add the finely chopped chocolate bar to the mixture and mix well. (5) Prepare a baking tray by greasing it with margarine. (6) Shape the dough and arrange it on the tray, then sprinkle with choco chips. (7) Bake the cookies in the oven for about 30 minutes until fully cooked. (8) After the cookies have cooled, store them in

packaging jars Figure 2.

Figure 2. The process of making cookies using sorghum flour

The next step was maked egg rolls using sorghum flour. The ingredients needed for making egg rolls are 1 cup of sorghum flour, 1/4 cup of water (or as needed), 1 egg, 1 tablespoon of vegetable oil, and 1/4 teaspoon of salt. To make eggroll follow these steps: (1) Mix the sorghum flour, salt, and vegetable oil in a bowl. (2) Beat the egg and add it to the flour mixture, stirring until well combined. (3) Gradually add water while continuously stirring until the dough becomes smooth and can be rolled. The dough should be thick enough to shape but not too liquid. (4) Heat an anti-stick egg roll pan over medium heat and lightly grease the pan with oil. (5) Pour the dough mixture into the pan in small amounts and spread it evenly to form a thin layer. Cook until the bottom is golden brown and the top is half-dry, then flip and cook the other side until done. (6) Remove and repeat the process until all the dough is used up. (7) Once cooled, store them in a packaging container Figure 3.

After the processing of sorghum-based functional food products was completed, a formative evaluation was conducted by distributing questionnaires to all members of the Cempaka Women's Farmers Group (KWT Cempaka). The questionnaire covered aspects such as taste and texture, with the aim of obtaining initial feedback from participants to assess their first impressions of the sorghum-based processed products, such as cookies and eggrolls. The results of the questionnaire are presented in Table 1. The results of the questionnaire showed that processed cookies from sorghum flour were categorized as delicious by 80% and 17% were categorized as less tasty. Meanwhile, the results of the evaluation of processed eggrolls from sorghum flour in the delicious category were 72% and 23% very tasty. Based on the opinion of the KWT Cempaka, cookies made from sorghum flour have a slightly coarse texture and are less sweet in taste, while sorghum-based eggrolls have a soft yet fragile texture. This is due to the tannin content and the absence of gluten in sorghum flour.

https://doi.org/10.12928/spekta.v6i1.12149

Figure 3. The process of making eggroll using sorghum flour

Table 1. Formative Evaluation Results

No.	Feedback	Questionnaire Results (%)			
		Bad	Less Tasty	Delicious	Very tasty
1.	What do participants think about processed cookies from sorghum flour	0	17	80	3
2.	What do participants think about processed eggroll from sorghum flour	0	5	72	23

High tannin content is typically found alongside high fiber content. According to previous research, sorghum contains 6.72% crude fiber, which is higher than the crude fiber content of wheat flour. This higher fiber content can affect the final texture of the product, making it feel denser or coarser compared to wheat-based products [19]. On the other hand, the less sweet taste is caused by sorghum not having gluten protein, while gluten protein functions to hold gas during the baking process, thus contributing to the development of the dough. Based on the research results, the increase in the percentage of sorghum flour substitution is directly proportional to the decrease in the quality of the texture of cookies, where the formulation of cookies with 100% sorghum flour shows a crispy texture characteristic but tends to be fragile and easily broken [19]. The crispy and fragile texture can be improved by adding other ingredients. According to a previous study, the organoleptic and hedonic tests on semprong cookies showed that a formulation with 30% sorghum flour and 70% rice flour resulted in a crispier texture and was more preferred by panelists compared to other treatment products [20]. However, cookies and eggrolls can still be accepted by people's tastes, and have the potential to be widely marketed [3].

3.3. Packaging and Branding

At this stage, Figure 4 the implementation team also helps in designing logos and packaging. Previously, the packaging was still very simple, still wrapped in clear plastic and tied with rubber, so it was necessary to make a new logo and packaging, the goal was for the

public to get to know and be interested in the products to be purchased. In addition, if marketing is expanded, it is possible that products will be sold across regions. So the packaging process requires a container that can store more durable products. That is packaging can attract the attention of buyers or consumers to certain brands, improve image, and stimulate consumer perception of the product. The following is the logo and packaging for sorghum-based processed food products from KWT Cempaka [21].

Figure 4. Official Design and Packaging

Figure 5. Packaging dan branding produk cookies dan eggroll sorgum

During this community service activity, the resource person provided understanding and motivation to the farmer women's group regarding the importance of packaging and branding. What was socialized by the resource person to the participants was material on packaging design, the role of logos in branding, product marketing with the use of social media. The importance of packaging and branding is done because according to empirical data, attractive packaging affects a person's buying interest in the product [22]. Not only purchase intention, even packaging and branding affect the level of buying decisions [23]. Furthermore, the resource person provides open consultation and discussion to the women's group to dissect and at the same time provide suggestions in product branding Figure 5.

After the packaging and branding activities were carried out, a summative evaluation was carried out which aimed to assess the participants' understanding and ability to apply the

https://doi.org/10.12928/spekta.v6i1.12149

concepts that had been conveyed during the training, as well as to measure the extent of the participants' increased competence in designing product packaging and conducting branding strategies. This evaluation also aimed to see the effectiveness of the training methods used and their impact on the participants' readiness to market their products more professionally. The results of the formative evaluation conducted during the activity process are presented in Table 2 as follows:

Table 2. Sumative Evaluation Results

No.	Feedback	Questionnaire Results (%)			
		Don't Understand	Understand	Quite Understand	Understand very well
1.	Does the participant understand the meaning of product branding	0	0	11	89
2.	Whether participants understand packaging design and logos will have an impact on product promotion	0	3	67	30
3.	Did participants understand branding in improving brain mainded custumor after participating in this socialization	5	75	12	8

The summative evaluation results after the product packaging and branding training in Table 2 show that 89% of the participants fully understood the meaning of product branding. Participants from KWT Cempaka also realized that branding can help differentiate KWT Cempaka products from other KWTs or competitors. A total of 67% of participants moderately understood, and 30% strongly understood the impact of packaging design and logo on product promotion. The training also aimed for participants to understand branding in increasing brand-minded customers, with 8% of participants strongly understanding and 75% understanding this concept. Brand-minded customers are consumers who have high awareness of a brand and tend to consider the brand as a major factor in purchasing decisions. This type of consumer usually has loyalty to certain brands because of the perceived quality, emotional value, or identity built by the brand [24].

In addition, unique names, logos and designs can make products more recognizable and memorable to consumers compared to similar products in the market. Packaging and logo design can build trust and loyalty among customers. When consumers feel connected to a brand and have a positive experience, they are more likely to repurchase and recommend the product to others [25]. These results indicate the need for the sustainability of the branding program at KWT Cempaka, so that business actors can better understand the importance of having a brand with a clear and trustworthy image. It is important for a brand to pay attention to consistency in every element of brand identity, such as logo, color, message, and overall customer

experience. So that the diversity of food products such as sorghum-based cookies and eggrolls can reach a wider market segment including in the digital market.

On the other hand, the production of sorghum-based cookies and eggrolls presents its own set of challenges. One of the primary obstacles is the relatively high production cost, particularly because sorghum crops are not yet widely available in the Aceh Barat region. Furthermore, the lack of post-harvest infrastructure poses significant logistical challenges, especially for larger-scale production. In addition, sorghum-based products face stiff competition from wheat-based products, which are more widely known and have textures more familiar to the general consumer palate. Nevertheless, sorghum offers notable nutritional benefits, including high fiber, iron, magnesium, antioxidants, and a gluten-free profile, making it ideal for individuals with gluten intolerance and potentially supporting stunting prevention programs. With appropriate education, promotion, and product innovation, sorghum holds strong potential for acceptance in the global market, particularly amid growing public interest in nutritious local foods. Therefore, the development of sorghum-based products requires an innovative approach, both in terms of formulation and market education, to ensure that the functional value and advantages of sorghum as a local food can be more widely accepted.

4. Conclusion

The community empowerment program through sorghum-based product development has demonstrated promising outcomes in enhancing product diversity and local branding awareness, with 80% of respondents rating sorghum cookies and 72% rating sorghum eggrolls as delicious. Furthermore, 89% of participants showed a strong understanding of product branding, indicating the effectiveness of the training. Strategic measures, including training, SOP development, and partnership building, have been initiated to ensure production sustainability by the Women Farmers Group (KWT).

However, the study has limitations in terms of participant scope, formulation innovation, and economic analysis. Future research should expand to more diverse populations, explore composite product innovations, and evaluate the long-term nutritional and economic impacts. Policy support at the regional level will be essential to create a resilient and inclusive sorghum-based food ecosystem with sustainable community benefits.

Acknowledgment

This activity is funded by the DRTPM - BIMA Grant Fund from the Directorate of Research, Technology, and Community Service in 2024. We would like to express our gratitude to the parties who provided the funds, team members, women's farmer groups, and all parties involved in the process of implementing this community service.

https://doi.org/10.12928/spekta.v6i1.12149

References

[1] D. Andriani and D. Wirnas, "Efektivitas Metode Seleksi Pedigree dan Modified Bulk pada Tiga Populasi Sorgum (Sorghum bicolor [L.] Moench)," *J. Agron. Indones. (Indonesian Journal of Agronomy)*, 2019, [Online]. Available: https://journal.ipb.ac.id/index.php/jurnalagronomi/article/view/27661.

[2] T. Gerik, B. Bean, and R. Vanderlip, "Sorghum growth and development." oaktrust.library.tamu.edu, 2024, [Online]. Available: https://oaktrust.library.tamu.edu/bitstreams/0d55712d-0172-48d4-b597-b8a4765b9ed2/download.

[3] I. Mulyawanti, E. A. Suryana, C. Winarti and S. J. Munarso, "Model pengembangan agroindustri sorgum mendukung diversifikasi pangan: Studi kasus di Kabupaten Flores Timur, Provinsi Nusa Tenggara Timur," *Anal. Kebijak. Pertanian*, 2023, [Online]. Available: https://epublikasi.pertanian.go.id/berkala/akp/article/view/3580.

[4] A. Fauziyah, S. A. Marliyati, and L. Kustiyah, "Substitusi tepung kacang merah meningkatkan kandungan gizi, serat pangan, dan kapasitas antioksidan beras analog sorgum," *J. Gizi Dan Pangan*, 2017, [Online]. Available: https://journal.ipb.ac.id/index.php/jgizipangan/article/view/18088.

[5] L. L. de Oliveira, G. T. de Oliveira, E. R. de Alencar, V. A. V. Queiroz and L. F. de A. Figueiredo, "Physical, chemical, and antioxidant analysis of sorghum grain and flour from five hybrids to determine the drivers of liking of gluten-free sorghum breads," *LWT*. Elsevier, 2022, [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0023643821015607.

[6] S. D. Farrah, E. Emilia, E. Mutiara, R. Purba, F. T Ingtyas and M. Marhamah, "Analisis kandungan gizi dan aktivitas antioksidan pada cookies substitusi tepung sorgum (Sorghum bicolor, L)," *Sport Nutr. Journal*, 2022, [Online]. Available: https://journal.unnes.ac.id/sju/spnj/article/view/55195.

[7] S. Sufri, Nurhasanah, M. Jannah, T. P. Dewi, F. Sirasa and S. Bakri, "Child stunting reduction in Aceh Province: challenges and a way ahead," *Maternal and Child J*. Springer, 2023, doi: 10.1007/s10995-023-03601-y.

[8] M. A. Kurniawan, S. M. A. Mazhir, and I. Mundzir, "Understanding Open Defecation Practices in Rural Aceh, Indonesia Through Community Based Total Sanitation (known in Bahasa as Sanitasi Total Berbasis Masyaralat or STBM)," *Unicef*. 2021. https://www.susana.org/knowledge-hub/resources?id=4884

[9] R. W. Prada, Y. F. Medho, and V. I. A. Boro, "Inovasi Pembuatan Makanan Tambahan dari Sorgum Guna Mencegah Stunting," *RENATA J. Pengabdi. Masyarakat Kita Semua*, 2023, [Online]. Available: https://jurnalpkm.id/index.php/renata/article/view/27.

[10] A. D. Wahyani and Y. D. Rahmawati, "Analisis kandungan serat pangan dan zat besi pada cookies substitusi tepung sorghum sebagai makanan alternatif bagi remaja putri

anemia," *JKM (Jurnal Kesehatan Masyarakat)*, 2021, [Online]. Available: http://jurnal.stikescendekiautamakudus.ac.id/index.php/JKM/article/view/685.

[11] L. Korol-Bezpala, S. Merzlov, V. Marshalok, Y. Shurchkova, H. Kalinina and O. Hrebelnyk, "Organoleptic characteristics and nutritional value of roasted peanuts from the chain of hotel and restaurant complexes in Kiev region," *Scientific Messenger LNU of Veterinary Medicine and Biotechnologies*, 2021, [Online]. Available: https://nvlvet.com.ua/index.php/food/article/view/4215.

[12] H. Zheng, Y. Dang, and N. Sui, "Sorghum: a multipurpose crop," *J. Agric. Food Chem*, 2023, doi: 10.1021/acs.jafc.3c04942. doi: 10.1021/acs.jafc.3c04942

[13] A. Borrell, E. van Oosterom, B. George-Jaeggli, D. Rodriguez, J. Eyre, D. J. Jordan, E. Mace, V. Singh, V. Vadez, M. Bell, I. Godwin, A. Cruickshank, Y. Tao, and G. Hammer, "Sorghum," *Crop Physiol. case Histories for Major Crops*, 2021, [Online]. Available: https://www.sciencedirect.com/science/article/pii/B9780128191941000050.

[14] N. F. Aryani, K. Khatimah, F. N. Tajuddin, A. I. Khairunnisa, N. Magfira, and N. W.Aminuddin, "Budidaya Tanaman Sorgum (Sorghum Bicolor (L.) Moench)." eprints.unm.ac.id, 2022, [Online]. Available: https://eprints.unm.ac.id/26130/1/Buku KP Tim Balitsereal Biologi UNM.pdf.

[15] S. Budijanto, N. F. Sadek, N. D. Yuliana, E. Prangdimurt, and B. P. Priyosoeryanto, "Potensi Beras Analog sebagai Alternatif Makanan Pokok untuk Mencegah Penyakit (Degeneratif Potency of Rice Analogue as Staple Food Alternative to Prevent Degenerative Dieases)," *J. Pangan*, 2016, [Online]. Available: http://www.jurnalpangan.com/index.php/pangan/article/view/307.

[16] M. Aqil, N. N. Andayani, and R. Efendi, *HANJELI; Teknologi Budidaya dan Pascapanen Menunjang Diversifikasi Pangan*. books.google.com, 2023. https://nasmedia.id/store/hanjeli-teknologi-budidaya-dan-pascapanen-menunjang-diversifikasi-pangan-2/

[17] R. Tanwar, A. Panghal, G. Chaudhary, A. Kumari, and N. Chhikara, "Nutritional, phytochemical and functional potential of sorghum: A review," *Food Chemistry Advances*. Elsevier, 2023, [Online]. Available: https://www.sciencedirect.com/science/article/pii/S2772753X23003222.

[18] A. Khoddami and V. Messina, "Sorghum in foods: Functionality and potential in innovative products," *Crit. Rev. in Food Science and Nutrition*, 2023, doi: 10.1080/10408398.2021.1960793.

[19] H. Hermeni and J. Jumiyati, "Daya Terima, Mutu Hedonik dan Profil Nilai Gizi Kukis Substitusi Tepung Sorgum (Sorghum bicolor)," *Ghidza J. Gizi dan Kesehatan*, 2023, [Online]. Available: https://jurnal.fkm.untad.ac.id/index.php/ghidza/article/view/1036.

[20] P. Pramudito and F. Rachim, "Uji coba pembuatan kue semprong dengan tepung sorgum sebagai substitusi tepung beras," *Jurnal Pariwisata*. scholar.archive.org, 2022, [Online]. Available:

 https://doi.org/10.12928/spekta.v6i1.12149

https://scholar.archive.org/work/qz6riu5wknhltfp4iqsi2ejxii/access/wayback/https://ejournal.bsi.ac.id/ejurnal/index.php/jp/article/download/13592/pdf.

[21] I. Sari and D. Putri, "Pegembangan UMKM Jajan Sengait Di Desa Sading melalui Inovasi Branding dan Packaging," *INTEGRITAS J. Pengabdi.*, 2021, [Online]. Available: https://www.unars.ac.id/ojs/index.php/integritas/article/view/1072.

[22] I. Setyawan, R. Laksono, J. R. Gultom, and R. N. Bariski, "Branding, Packaging dan Promosi 'Noga' Sebagai Produk Unggulan Kelompok Tani Mukti Desa Sukajadi, Tamansari, Bogor," *Jurnal Pengabdian Masyarakat Ilmu Keguruan dan Pendidikan (JPM-IKP)*. 2022. https://trilogi.ac.id/journal/ks/index.php/jpmikp/article/view/1198/551

[23] D. Anggriani, "Pengaruh Merek (Brand), Kemasan (Packaging) dan Harga (Price) Terhadap Keputusan Pembelian Selai Buah Homemade Marwah di Medan," *Jurnal Manajemen Tools*. 2019. https://jurnal.pancabudi.ac.id/index.php/JUMANT/article/view/687

[24] F. Sembiring, A. Rahman, S. S. Fauziah, Mauliyati, S. Sherenian, and Y. Setiawan, "Peningkatan Branding Produk Umkm Desa Cisolok Berbasis Ekonomi Kreatif Melalui Media Sosial," *J. Pengabdi. Kepada Masyarakat Abdi Putra*, 2024, [Online]. Available: https://abdiputra.nusaputra.ac.id/article/view/242.

[25] F. Sudirjo, T. Purwati, Widyastuti, Budiman Y. U, and M. Manuhutu, "Analisis Dampak Strategi Pemasaran Digital dalam Meningkatkan Loyalitas Pelanggan: Perspektif Industri E-commerce," *Jurnal Pendidikan Tambusai*, 2023, [Online]. Available: https://jptam.org/index.php/jptam/article/view/7422