



POTATO INNOVATION TO INCREASE SALE VALUE INTO FRIED POTATO WITH SAMBAL AND INNOVATION INTO A MOISTURIZER PRODUCT FOR SKIN HEALTH IN GEUCEU MENARA VILLAGE, BANDA ACEH CITY

INOVASI KENTANG UNTUK PENINGKATAN NILAI JUAL MENJADI SAMBAL GORENG DAN INOVASI KENTANG MENJADI PRODUK PELEMBAB UNTUK KESEHATAN KULIT DI GAMPONG GEUCEU MENARA, KOTA BANDA ACEH

Wahyu Lestari^{1,2*}, Rita Meutia², Mulia Saputra³

¹ Department of Dermatology and Venereology, Universitas Syiah Kuala, Banda Aceh, Indonesia

² Department of Dermatology and Venereology, dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia

³ Economic and Business Faculty, Universitas Syiah Kuala, Banda Aceh, Indonesia

*Penulis korespondensi: wahyu_lestari2000@usk.ac.id

Abstract

Potatoes are one of the food crops that most widely consumed as a source of energy. Processed potato foods vary greatly, one of which is fried potato sambal. The aim of this Community Service (PkM) is to provide product innovation to business owners so that they can increase the income of the owner of the fried potato sambal business. The place where this community service is carried out is at the Fried Potato Sambal Production House in Geuceu Menara Village, Jaya Baru Subdistrict, Banda Aceh. This production house usually uses red potatoes as the main raw material. In this PkM activities, potato skins, which are usually waste, will be innovated into moisturizing products for the skin. There are two types of potatoes used in this PkM activities, namely yellow potatoes and red potatoes. Both of the potatoes were peeled, those peel were extracted and then these two extracts will be used as the main ingredients in making moisturizer products. Antioxidant activity was also determined using the DPPH method. The results obtained were that the extracts of both types of potato skin had antioxidant activity with IC₅₀ values of 5.10 (yellow potato skin) and 11.32 (red potato skin). In conclusion, yellow potato skin extract and red potato skin extract have strong antioxidant activity so that they can be used as a good moisturizer product.

Keywords: antioxidant; moisturizers; red potato; yellow potato

Abstrak

Kentang merupakan salah satu tanaman pangan yang paling banyak dikonsumsi sebagai sumber energi. Makanan olahan kentang sangat bervariasi, salah satunya adalah sambal goreng kentang. Tujuan dari pengabdian kepada Masyarakat (PkM) ini adalah untuk memberikan inovasi produk kepada pemilik usaha sehingga dapat meningkatkan pendapatan dari pemilik usaha sambal goreng kentang ini sendiri. Tempat dilaksanakannya pengabdian masyarakat ini adalah pada Rumah Produksi Sambal Goreng Kentang di Gampong Geuceu Menara, Kecamatan Jaya Baru, Kota Banda Aceh. Usaha ini biasanya menggunakan kentang merah sebagai bahan baku utama. Pada pengabdian ini, kulit kentang yang biasanya menjadi limbah, akan diinovasikan menjadi produk pelembab untuk kulit. Terdapat dua jenis kentang yang digunakan pada kegiatan PkM ini, yaitu kentang kuning dan kentang merah. Kedua jenis kentang tersebut dikupas kulitnya dan dilakukan ekstraksi, selanjutnya kedua ekstrak ini akan dijadikan sebagai bahan utama dalam pembuatan produk pelembab. Penentuan aktivitas antioksidan dengan metode DPPH. Hasil yang didapatkan adalah ekstrak kedua jenis kulit kentang tersebut memiliki aktivitas sebagai antioksidan dengan nilai IC₅₀ sebesar 5,10 (kulit kentang kuning) dan 11,32 (kulit kentang merah). Kesimpulannya, ekstrak kulit kentang kuning dan ekstrak kulit kentang merah mempunyai aktivitas antioksidan yang kuat sehingga dapat digunakan sebagai produk pelembab yang baik.

Kata kunci: antioksidan; pelembab; kentang kuning; kentang merah

Article ID 34399 / **Submitted** 20-09-2023 / **Revision** 23-10-2023 / **Accepted** 26-10-2023

Introduction

MSMEs (Micro, Small and Medium Enterprises) have a very large role in advancing the economy of a country or region. These

MSMEs are also very helpful for the state or government in terms of job creation and through MSMEs many new work units use new workers who can support household income, thus greatly

helping efforts to reduce unemployment. MSMEs in the culinary sector are one of the MSMEs that have rapid development today (Fidela *et al.* 2020).

Potatoes (*Solanum tuberosum* L.) are the fourth most consumed food crop after corn, wheat and rice in the world. It is also one of the most studied plants in much of the recent literature (Jiang *et al.* 2022; Adekanmbi *et al.* 2023). In Indonesia, specifically in Aceh Province, potatoes are the third leading commodities after coffee and avocado (Nurmala *et al.* 2021). Potatoes have high nutritional value, including lots of carbohydrates, minerals and vitamins, so they can be used as a source of carbohydrates (Ismadi *et al.* 2021).

Potatoes (*Solanum tuberosum* L.) belong to the Solanaceae family, which have various varieties including *Solanum andigenum* L. and *Solanum demissum* L. Potatoes can be classified according to the color of their tubers, namely yellow potatoes, white potatoes and red potatoes (Sunarjono, 2013). Red potatoes have red skin, but the tuber flesh is yellowish white. Red potatoes have a sweeter taste than other types of potatoes (Simbolon *et al.* 2021). Red potatoes contain more carbohydrates and lower water content. This makes processed red potatoes into chips and other foods more savory and delicious. Red potatoes contain some sodium content, as a source of vitamins C and B1, the minerals phosphorus, iron and potassium (Fauzi *et al.* 2016). Quercetin is found in high amounts in red potatoes. In vivo and in vitro tests have shown it to have anti-inflammatory and antioxidant properties (Beals 2019).

Potatoes are the most valued horticultural commodities in the world. Food and Agriculture Organization of the United Nations (FAO) stated that in 2019, potato production has increased up to 370,436,581 tonnes. This production would be followed by several processing wastes that may cause environmental issues, such as the potato skin (Rodríguez-Martínez *et al.* 2021).

Potato skins are the largest part of potato processing waste. Potato skins are often thrown away. In fact, potato skins contain nutritionally and pharmacologically interesting components. Potato skins contain several antioxidant compounds such as phenolics, so they can be used as a source of natural antioxidants (Joly *et al.* 2020).

Potato periderm contains enzymes and metabolites that can respond to biotic and abiotic stresses. Phenolic compounds are the most abundant secondary metabolites in plants. Potato skins have a higher amount of phenolic compounds than potato flesh. This compound is important in plant defense mechanisms as an antioxidant. Synthesis of phenolic compounds is

induced in response to biotic and abiotic stimuli, such as drought, cooling, pathogens, or nutrient deficiencies. As a group of phenolic compounds, anthocyanin synthesis and accumulation in potato tissues are also considered as indicators of stress resistance (Singh *et al.* 2021).

In this research, potatoes will be made into fried potato with sambal sauce. The first step in this process is peeling the potato skin, then cutting the potatoes to a thickness of 0.2-0.5 cm and adding spices to give a savory and crunchy taste, then frying them. After that we will drain the potatoes to prevent oxidation so that their texture become soft, and then we will add spices according to the innovation that has been planned and the final method is to pack the product from fried potato tubs (Tantalu *et al.* 2017). However, in this survey community service location, they only used red potato as a basic ingredient of fried potato with sambal sauce. Potato skins will be used in this study to determine the antioxidant activity of potato skins so that they can be used as a good moisturizer.

Methods

This community service involves the "Fried Potato Sambal Production House" in Geucue Menara village, Jaya Baru subdistrict, Banda Aceh (Figure 1). Fried potato sambal entrepreneurs approach various aspects. The approach to employees is carried out by providing direction to employees regarding how to make it through discussion. The choice of ingredients is very important in the production of fried potato sambal sauce, especially the potato type. Employees will be introduced to good packing methods. This method is effective to improve the quality of fried potato sambal sauce production in the production house. One method that can be used to estimate changes in raw materials after receiving treatment is the hayamni method. The added value of potatoes processed into fried potato sambal sauce can be analyzed using this method. Apart from that, the development of potato raw materials into skin health products. The skin health product developed is a skin moisturizer.

With this guidance, the work can be carried out as expected and can produce various innovations in fried potato sambal sauce with the best quality. The type of potato used in making fried potato sambal sauce is a variety of red potatoes. Figure 1 shows the condition of the "Fried Potato Sambal Production House". Procedures for processing potatoes into fried sambal sauce using various innovations and potato skins into skin care products are carried out through training and counseling. The training

and counseling were conducted once a week for three weeks and the duration of each training and counseling was 100 minutes. For this reason, a laboratory medium is needed to produce a product that is beneficial for the skin.



Figure 1. The factory's place of Fried Potato Sambal

Result and Discussion

Survey Results

In the process of producing fried potato with sambal sauce, the business owner divided his employees into three groups. The division of these groups was done due to several process stages in making the product for selling fried potato sambal. After peeling the skin, the potatoes were cut into 0.2-0.5 cm chip-like thickness. The second group worked on the frying and packaging process of the product. The peeled potato skin will be dried in the sun for approximately 3 days and after drying it will be mashed and then taken to the laboratory to check the antioxidant content in the potato skin. This community service focused on increasing the income of owners and traders of fried potato sambal products, especially through various innovations so that fried potato sambal can be produced with high nutritional value and is liked by the public. Many things were conveyed by business owners, including any shortcomings and weaknesses that have existed while running this business. These shortcomings and weaknesses included the lack of product variation and low sales of products. Apart from that, there are many business innovations the owner wants to do, such as increasing the product variety in order to have a positive effect on sales, developing the insight and knowledge regarding the usage of potato skin in the making of a good moisturizer and improving the skill to advertise the products in an attractive way to engage the buyer. Therefore, assistance from community service helps business owners in developing their businesses.

All assistance provided, including the innovations, were aimed at small and medium entrepreneurs. In this case, the owner of the fried

potato sambal business was expected to be able to develop his business so that he could increase income and employ more employees. Some of the product innovations are sweet fried potato sambal sauce, peanut fried potato sambal sauce, original fried potatoes and corn fried potatoes. Besides using potatoes as food, another innovation provided is using potato skins to make a skin moisturizing product.

After this community service was held, there were several product variations of potato fried chili sauce produced, namely potato fried chili sauce with original flavour, lime flavoured fried potato chips, salty flavoured fried potato chips, corn flavoured fried potato chips, balado flavoured fried potato chips, opak and others. This causes an increase in income for business owners due to increasing product sales. Skills in potato processing and packaging have also increased so that this business can produce products with the best and various flavour (Figure 2 and Figure 3).

Antioxidant Activity Analysis Result

The antioxidant activity of yellow potato skin and red potato skin were tested using the DPPH method. DPPH (2,2-diphenyl-1-picrylhydrazyl) is a free radical and has a nitrogen atom with an unpaired electron. The principle of DPPH examination is the mechanism of giving hydrogen atoms to DPPH free radicals by antioxidant compounds. This method was chosen because it is the most frequently used, easy, simple and only requires a small number of samples (Ngibad and Lestari 2020). The measurements with this method used a spectrophotometer UV-Vis with a wavelength of 517 nm. The result of the antioxidant test of yellow potato skin is shown in Table 1.

Table 1 shows the result of the antioxidant activity test of yellow potato skin. The analysis is stated by IC₅₀ as an indicator of yellow potato skin's ability to inhibit 50% of the free oxidation process. Vitamin C is used in this test as a positive control.

The test result reveals that yellow potato skin extract has antioxidant activity with an IC₅₀ value of 5.10 µg/ml. The result of the antioxidant test of red potato skin is shown in Table 2.

Table 2 shows the result of the antioxidant activity test of red potato skin. The analysis is stated by IC₅₀ as an indicator of red potato skin's ability to inhibit 50% of the free oxidation process. Ascorbic acid (vitamin C) is used in this test as a positive control. The test result reveals that red potato skin extract has antioxidant activity with an IC₅₀ value of 11.32 µg/ml.

The results show that there are difference in antioxidant activity between yellow potato skin

and red potato skin, which are shown in **Table 3**. Yellow potato skin shows 5.10 µg/ml of IC₅₀ value, while red potato skin shows 11.32 µg/ml of IC₅₀ value. Vitamin C was used as a positive control because it is a very strong antioxidant and can neutralize free radicals through an electron transfer mechanism (Al-Niaimi and Chiang 2017).

Antioxidant activity could be classified as very strong if the IC₅₀ value is less than 50 µg/ml,

strong if the IC₅₀ value is 50-100 µg/ml, moderate if the IC₅₀ value is 100-150 µg/ml, and weak if the IC₅₀ value is more than 150 µg/ml (Salim, 2018). The greater the IC₅₀ value is, the smaller the antioxidant activity of an extract gets and vice versa. It is known that the IC₅₀ value of yellow potato skin extract (5.10 µg/ml) is higher than red potato skin extract (11.32 µg/ml). While, the IC₅₀ value for Vitamin C are 4.06 µg/ml and 4.17 µg/ml.

Table 1. Antioxidant test of Yellow Potato Skin

No	Control (EtOH.Abs)	Concentration (ppm)	Absorbance		%Inhibisi		IC ₅₀	
			Vitamin C	Potato	Vitamin C	Potato	Vitamin C	Potato
1	0.128	2	0.071	0.081	43.20	35.20	4.06	5.10
2		4	0.064	0.075	48.80	40.00		
3		6	0.053	0.062	57.60	50.40		
4		8	0.046	0.036	63.20	71.20		
5		10	0.032	0.024	74.40	80.80		

Table 2. Antioxidant test of Red Potato Skin

No	Control (EtOH.Abs)	Concentration (ppm)	Absorbance		%Inhibisi		IC ₅₀	
			Vitamin C	Potato	Vitamin C	Potato	Vitamin C	Potato
1	0.157	2	0.084	0.139	46.50	11.46	4.17	11.32
2		4	0.079	0.125	49.86	20.38		
3		6	0.076	0.119	51.59	24.20		
4		8	0.065	0.110	58.60	29.94		
5		10	0.061	0.079	61.15	49.68		

Table 3. Linear regression equation and the IC₅₀ value of Yellow Potato Skin extract, Red Potato Skin extract and vitamin C

Sample	Linear Regression Equivalent	IC ₅₀ Value
Yellow potato	$y = 6.12x + 18.8$	5.10
Red Potato	$y = 4.29x + 1.33$	11.32
Vitamin C (control)	$y = 3.84x + 34.4$	4.06
	$y = 1.91x + 42.03$	4.17



Figure 2. Red potato skin moisturizer



Figure 3. The making of red potato skin's moisturizer

Conclusion

Yellow potatoes and red potatoes both have very strong antioxidant activity. This fried potato sambal production house uses red potatoes as the main raw material. The existence of this antioxidant activity makes red potatoes can be used as a good moisturizer. This can be a new idea for potato processing entrepreneurs to make potato skins into skin moisturizers.

Acknowledgement

We would like to thank the Research Institution and Community Services (LPPM), Universitas Syiah Kuala (USK) which has facilitated and funded our community service with contract number: 673.066/UN11/SPK/PNBP/2023.

Daftar Pustaka

Adekanmbi T, Wang X, Basheer S, Nawaz RA, Pang T, Hu Y, Liu S. 2023. Assessing future climate change impacts on potato yields – a case study for Prince Edward Island, Canada. *Foods*, 12(6):1176.

Al-Niaimi F, Chiang NYZ. 2017. Topical vitamin C and the skin: mechanisms of action and clinical applications. *The Journal of Clinical and Aesthetic Dermatology*, 10(7):14–17.

Beals KA. 2019. Potatoes, nutrition and health. *American Journal of Potato Research*, 96:102–110.

Fauzi D, Baga LM, Tinaprilla N. 2016. Strategi pengembangan agribisnis kentang merah di Kabupaten Solok. *Jurnal Agraris*, 2(1):87–96.

Fidela A, Pratama A, Nursyamsiah T. 2020. Pengembangan Usaha Mikro Kecil dan Menengah (UMKM) dengan Program Pemasaran Desa Jambu Raya di Desa Jambu, Kabupaten Sumedang. *Jurnal Pusat Inovasi Masyarakat*, 2(3):493–498.

Ismadi, Annisa K, Nazirah L, Nilahayati, Maisura. 2021. Karakteristik morfologi dan hasil tanaman kentang varietas granola dan kentang merah yang dibudidayakan di Bener Meriah Provinsi Aceh. *Jurnal Agrium*, 18(1):63–71.

Jiang M, Shinnars-Carnelly T, Gibson D, Jones D, Joshi J, Wang-Pruski G. 2022. Irrigation effect on yield, skin blemishes, phellem formation, and total phenolics of red potatoes. *Plants*, 11(24):3523.

Joly N, Souidi K, Depraetere D, Wils D, Martin P. 2020. Potato by-products as a source of natural chlorogenic acids and phenolic compounds: extraction, characterization, and antioxidant capacity. *Molecules*, 26(1):177.

Ngibad K, Lestari LP. 2020. Aktivitas antioksidan

- dan kandungan fenolik total daun zodia (*Evodia suaveolens*). *ALCHEMY Jurnal Penelitian Kimia*, 16(1):94.
- Nurmala, Zahara H, Sullaida, Jamilah. 2021. Identification of business constraints and marketing of potatoes in Aceh's Gayo Highlands. *International Journal of Educational Review, Law and Social Sciences*, 1(2):6.
- Rodríguez-Martínez B, Gullon B, Yabez R. 2021. Identification and recovery of valuable bioactive compounds from potato peels: a comprehensive review. *Antioxidants*, 10(10):1–18.
- Salim R. 2018. Uji aktivitas antioksidan infusa daun ungu dengan metode DPPH (1,1-diphenil-2-picrylhidrazil). *Jurnal Katalisator*, 3(2):153–161.
- Simbolon J, Nainggolan LP, Sinuraya SAB. 2021. Monograf: gambaran produksi dan pendapatan petani kentang (*Solanum tubersum* L) di Tanah Karo. Cipta Media Nusantara: Jakarta.
- Singh B, Bhardwaj V, Kaur K, Kukreja S, Goutam U. 2021. Potato periderm is the first layer of defence against biotic and abiotic stresses: a review. *Potato Research*, 64:131–146.
- Sunarjono H. 2013. Bertanam 36 Jenis Sayur. Penebar Swadaya: Depok.
- Tantalu L, Rahmawati A, Setiyawan AI, Sasongko P, Ahmadi K, Mushollaeni W, Santoso B, Wirawan. 2017. Rekayasa Pengolahan Produk Agroindustri. Media Nusa Creative (MNC Publishing): Malang.