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NUTRITIONAL VALUE AND ACCEPTABILITY OF PURPLE SWEET POTATO (IPOMOEA BATATAS L.)

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ABSTRACT

Tapai is a traditional Indonesian food produced through the fermentation of carbohydrate-rich ingredients such as glutinous rice and cassava. The fermentation process utilizes yeast as a starter culture to convert the carbohydrates in the raw materials into sugars and alcohol. This study aimed to evaluate the acceptability and nutritional value of purple sweet potato (Ipomoea batatas L.) tapai. A Randomized Block Design (RBD) with nine treatments was employed. The results indicated that Formula 7 was the most preferred by the panelists. Proximate analysis of the best formula revealed the following composition per 100 grams of tapai: moisture content 70.69%, ash content 1.21%, energy 112.40 kcal, protein 1.25%, fat <0.02%, carbohydrates 26.85%, and fiber 0.90 grams.

Keywords: Tapai; Purple sweet potato (Ipomoea batatas L.); formula, nutritional value

INTRODUCTION

Tapai is a typical Indonesian food obtained from the fermentation process of ingredients that contain carbohydrates such as glutinous rice and cassava. The fermentation process is carried out by using yeast as a starter that converts carbohydrates in food into sugar and alcohol. Tapai is generally made from cassava or from sticky rice (Taliku, Maspeke and Une, 2021). Tapai can also be made from sweet potatoes, as sweet potatoes contain quite good carbohydrates (Azara *et al.*, 2021).

Tapai contains probiotics and antioxidants that are good for health (Taliku, Maspeke and Une, 2021), (Azara *et al.*, 2021), (Mardyansah, Nadiroh, Rohmawati and L. A. Syahri, 2020). In addition, the antioxidants in purple sweet potato tapai can lower blood sugar in patients with diabetes mellitus (DM) can also lower blood pressure in hypertensive patients (Setiawan and Sudiyat, 2021), (Fauziyah *et al.*, 2024), (Prawitasari, 2019), (Triandita *et al.*, 2016), (Zatalia and Sanusi, 2013). Diabetes is related to tissue damage in the condition of hyperglycemia. This can occur in conditions of oxidative stress and decreased antioxidant defenses in the body (Prawitasari, 2019). Giving antioxidants to people with DM aims to inhibit the production of free radicals and increase enzymes to prevent oxidative stress. Several studies show that giving tapai to people with DM can lower blood sugar levels (Prayitno, 2018), (Suhartatik *et al.*, 2013), (Samsuri, Samsuri and Kendran, 2020), (Khoirunnisa, Putranto and Nurwati, 2023).

Fermentation is traditionally done by steaming at a temperature of ±100 with a time range of 15–20 minutes (Islami, 2019, Aditya, Yusa and Yusasrini, 2012). Steaming purple sweet potatoes for too long will result in the product losing a lot of nutrients contained in it (Aditya, Yusa and Yusasrini, 2012), (Taliku, Maspeke and Une, 2021), . Steaming for a long time will produce tapai that is too soft in texture and sometimes destroyed, on the other hand, steaming that is too short can produce tapai that has a hard texture and is not in demand by the public (Aditya, Yusa and Yusasrini, 2012). In addition to the length of steaming time, the concentration of yeast and the fermentation time can also affect the characteristics of the purple

sweet potato fermentation produced. Fermentation for too long can produce tapai that has a high alcohol content and a sour taste that is not liked by the public (Aditya, Yusa and Yusasrini, 2012), (Mardyansah, Nadiroh, Rohmawati and A. L. Syahri, 2020).

MATERIALS AND METHODS

The ingredients used in making tapai are purple sweet potato (Ipomoea batatas L.) purchased at the traditional market km 5 from Pagaralam City, tapai yeast purchased online which has a distribution permit P-IRT 2091671010576-28, and banana leaves, while the materials for proximate examination are: Tools used: knives, steamers, basins, tablecloths and chemical tools.

The research design used was a Group Random Design (RAK) with factorial, namely yeast concentration and fermentation time. The formulation of fermentation is proposed as follows:

Table 1. Purple Sweet Potato Tapai Formulation (Ipomoea batatas L.)

Formula	Factorial
A1B1	yeast 1,5 % fermentation time 72 hours
A1B2	yeast 1,5 % fermentation time 96 hours
A1B3	yeast 1,5 % fermentation time 120 hours
A2B1	yeast 3 % fermentation time 72 hours
A2B2	yeast 3 % fermentation time 96 hours
A2B3	yeast 3 % fermentation time 120 hours
A3B1	yeast 4,5 % fermentation time 72 hours
A3B2	yeast 4,5 % fermentation time 96 hours
A3B3	yeast 4,5 % fermentation time 120 hours

1. Fermentation procedure
   a. The purple sweet potato is weighed and then peeled off and washed thoroughly.
   b. Weigh the net weight of the tubers and cut them to make them easier to boil or steam
   c. Steam and/or boil the sweet potato for 30 minutes then refrigerate to room temperature.
   d. Yeast tape is mashed with a blender weighed 1.5 %; 3 % and 4.5 %.
   e. The sweet potato is smeared with yeast until smooth and fermented for 72, 96 and 120 hours
2. Organoleptic Tests
   a. Before the organoleptic test was carried out, the researcher gave an explanation to the panelists about the procedure for conducting the organoleptic test.
   b. Panelists were asked to enter the sensory room in an orderly manner and occupy the seats that have been provided.
   c. Panelists were asked to taste 9 formulas of tapai products and give an assessment of the color, aroma, texture, taste and overall on the form that has been provided
   d. Each time they taste a formula, panelists are asked to drink water to neutralize the taste buds. After that, it was continued to taste other formulas

   To become a panelist, you must meet the following requirements:
   a. Physically and spiritually healthy
   b. Menus painted
   c. Can read and write
   d. Be willing to be a panelist
3. Proximate test

   In terminology, the word "proximate" implies that the value produced from this analysis is an approximation, not an actual number, considering that each analyzed fraction still allows for the existence of a small number of other components that are inherently different but inseparable in the measurement process (Nasria, Tellu and Nurdin, 2024). Proximate analysis is a method used to determine the main nutritional content of a food, including the content of protein, fat, carbohydrates, water, and ash, which together provide comprehensive results regarding the nutritional value of a product (Nasria, Tellu and Nurdin, 2024).

   In its implementation, each proximate parameter is tested with different and standardized analysis methods, namely thermogravimetry for moisture content, dry ashing for ash content, Soxhlet extraction for fat, Kjeldahl destruction for proteins, and calculation *by difference* for carbohydrates, so that each component can be determined systematically (Yunisa, Suhaera and Sari, 2023).

The determination of the moisture content in a food product has an important role because the water content is directly related to the durability of the product during storage. Moisture content testing is performed using the thermogravimetric method, which is by heating the sample in the oven at 105°C for 15 minutes so that the water contained in the material evaporates, then the difference in sample weight before and after heating is used to determine the amount of moisture contained in the sample (Marliza, Sammulia and Mayefis, 2023).
Ash content testing was carried out using the dry ashing method using a furnace at 600°C for 3–7 hours until the sample turned into white ash. The ash content value produced reflects the amount of inorganic or mineral content found in the food being tested (Marliza, Sammulia and Mayefis, 2023).
Determination of fat content was carried out using the Soxhlet method, where the dried and mashed samples were wrapped in filter paper and then extracted using an organic solvent n-hexane repeatedly. This method utilizes the properties of fats that can only be soluble in organic solvents, so that all fat fractions in the sample can be extracted optimally (Marliza, Sammulia and Mayefis, 2023).

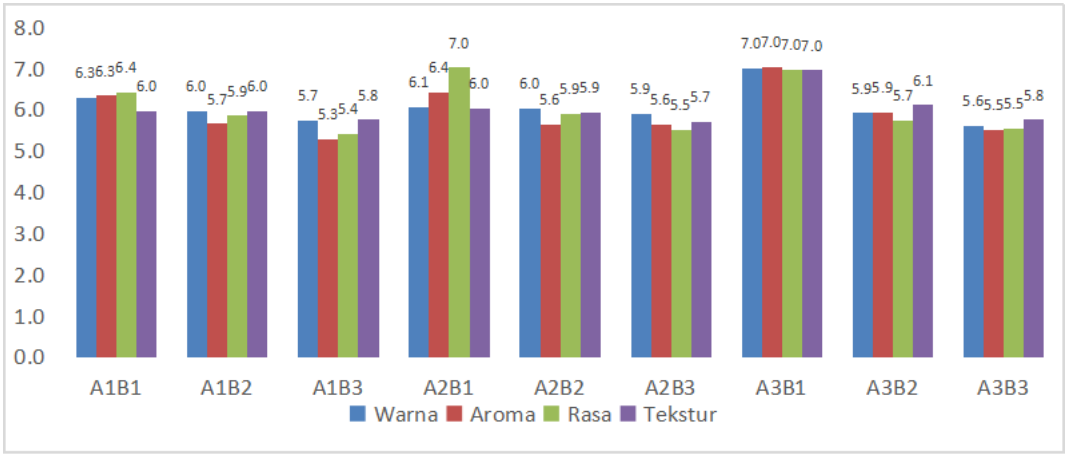
Protein levels are determined using the Kjeldahl method which consists of three stages, namely destruction, distillation, and titration. The principle of this method is to analyze the total nitrogen content in the sample, which is then used as the basis for calculating the protein content of the food tested (Marliza, Sammulia and Mayefis, 2023).

Carbohydrate content is not measured directly through laboratory testing, but is calculated calculatively using the *by difference method*, which is by subtracting the total number of proximate components that have been analyzed (moisture content, ash content, protein content, and fat content) from 100%, as shown in the following formula (Marliza, Sammulia and Mayefis, 2023).
Carbohydrate content (%) = 100% − (% water content + % ash content + % protein content + % fat content).

RESULTS AND DISCUSSION

1. Acceptability of Purple Sweet Potato Tapai (Ipomoea batatas L.)

The results of the organoleptic test can be seen in Graph 1.



Graph 1. Results of Organoleptic Test of Tapai Purple Sweet Potato (Ipomoea batatas L.)

From Graph 1, it can be seen that the formula that was most preferred by the panelists was the A3B1 formula. The parameters assessed by the 50 panelists were aroma, color, texture, and taste. The assessment given by the panelists was 7.0 for all parameters. This shows that the panelists really like the A3B1 formula of the purple sweet potato (Ipomoea batatas L.) produced. According to the panelists, the A1B3 formula has brighter colors, a more fragrant aroma, a less mushy texture, and the resulting fermentation taste is sweeter. The second formula that the panelists liked was the A2B1 formula and the third was the A1B1 formula. Formula A1B3 is a formula with a yeast concentration of 4.5% and a fermentation time of 72 hours.

Color. The aroma, taste and texture in the making of tapai are greatly influenced by the concentration of yeast and the duration of fermentation. Too little concentration of yeast makes the color of the fermentation less attractive, the taste less sweet and the aroma less so fragrant. Texture, taste and aroma are also affected by the fermentation time. The longer the fermentation, the softer the texture of the tape, the more acidic the taste becomes and the aroma is more pungent. The longer the fermentation, the alcohol content will increase which causes the aroma to be more pungent (Ardiansyah, Kalsum and Nasirudin, 2022), (Mardyansah, Nadiroh, Rohmawati and A. L. Syahri, 2020), (Rizki Mulia and Sitompul, 2021)

2. Nutritional Value of Purple Sweet Potato Tapai (Ipomoea batatas L.)

The calculation of the nutritional value of tapai was carried out at the Saraswanti Indo Genetech Laboratory in Bogor. The calculation of this nutritional value is carried out by proxy test. Fiber and alcohol content testing is also performed. Laboratory testing was carried out on the 3 (three) best formulas according to the panelists. The results of the proxy test, fiber content and alcohol content can be seen in Table 2.

Table 2. Proximat Test, Fiber Content and Alcohol Content
Tapai Ubi Jalar Ungu (Ipomoea batatas L.)

Parameter	A1B1	A2B1	A3B1
Kadar Air (%)	71.65	68.53	70.69
Kadar Abu (%)	1.43	1.30	1.21
Kadar Protein (%)	2.37	1.36	1.25
Kadar Lemak (%)	<0.02	<0.02	<0.02
Karbohidrat (%)	24.55	28.81	26.85
Energi	107.68	120.68	112.40
Serat kasar (g)	1.84	1.22	0.90
Etanol	2,93	2,96	3,04

When viewed from the results of the proximate test, it shows that the energy content of purple sweet potato tapai is quite low from the three formulas, which ranges from 107.68 – 120.68. This low energy level is related to the fermentation process by enzymes from yeast that convert carbohydrates into alcohol and acids so that the energy produced becomes lower (Sevina *et al.*, 2025). Based on the energy produced, purple sweet potato tapai can be used by people who are on a low-calorie diet or for diabetic mellitus patients. Apart from the low energy content of the three tapai, purple sweet potato is also low < 0.02%. This suggests consuming purple sweet potato fermentation is good for health because it is low in energy and fat. Although the protein content of purple sweet potato is quite low, it ranges from 1.25 - 2.37 because purple sweet potato is not the main source of protein, but it contributes enough to meet daily protein needs. The tapai carbohydrates of purple sweet potatoes range from 24.55 % - 28.81 %, this figure is low enough that it can be given to people with Diabetes Mellitus because the energy and fat are also low.

The alcohol content (ethanol) in all three purple sweet potato fermentation formulas is quite low. In a previous study by another researcher, a higher alcohol content was obtained compared to the results of this study, namely 5.46 with a fermentation time of 72 hours, 12.23 with a fermentation time of 96 hours, and 18.9 with a fermentation time of 120 hours. One of the causes of this difference is the concentration of yeast used. In this study, the concentration of yeast used was quite low compared to other studies. Purple sweet potato contains aleuron which produces anthocyanins with high intensity so that it has a deep purple color. The presence of aleuron in purple sweet potatoes causes the yeast of Saccharomyces cerevisiae to take longer to convert glucose into alcohol, so the alcohol content produced on the 2nd day of fermentation is still low, but the level continues to increase and is high as the fermentation time increases (Rejeki, Alfiraza and Kusuma, 2025). The higher the concentration of yeast used, the higher the ethanol content produced. Fermentation of fermentation using yeast can produce alcohol because in the yeast there is yeast, namely Saccharomyces cerevisiae, which plays a role in overhauling the starch contained in black sticky rice into alcohol. Khamir has long played a role in alcoholic fermentation (Yusuf and Anshar, 2018).

CONCLUSION

The formula for purple sweet potato tapai (Ipomoea limit L.) that the panelists liked the most is formua A1B3 with a yeast concentration of 4.5% and a fermentation time of 72 hours. The energy, fat, and carbohydrates of purple sweet potato (Ipomoea limit L.) are low enough that they can be consumed by people on a low-energy diet and also people with diabetes mellitus.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

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REFERENCES

Aditya, S., Yusa, N. and Yusasrini, N. (2012) 'Pengaruh Waktu Pengukusan Dan Fermentasi Terhadap Karakteristik Tape Ubi Jalar Ungu (Ipomoea Batatas Var. Ayamurasaki)', *Jurnal Ilmu dan Teknologi Pangan (Itepa)*, 1(1), pp. 1–9.

Ardiansyah, A., Kalsum, U. and Nasirudin, M. (2022) 'Pengaruh Lama Fermentasi Dan Konsentrasi Ragi Terhadap Mutu Tape Ubi Jalar Ungu (Ipomoea batatas L.) Varietas Ayamurasaki', *Exact Papers in Compilation (EPiC)*, 4(1), pp. 525–528. Available at: https://doi.org/10.32764/epic.v4i1.699.

Azara, R. *et al.* (2021) 'Quality of Fermented Purple Sweet Potato (Ipomea batatas var. Ayamurasaki) (Tapai) in Various Yeast Concentration and Steaming Time', *IOP Conference Series: Earth and Environmental Science*, 819(1). Available at: https://doi.org/10.1088/1755-1315/819/1/012052.

Fauziyah, R.N. *et al.* (2024) 'Effect of black sticky rice tape and purple sweet potato formulation on organoleptic properties and anthocyanin content of sweet purple mochi as a high anthocyanin snack to prevent cancer', *Healthcare in Low-resource Settings*, pp. 1–17. Available at: https://doi.org/10.4081/hls.2024.11853.

Islami, R. (2019) 'Pembuatan ragi tape dan tape', *Journal of Chemical Information and Modeling*, 53(9), pp. 56–62.

Khoirunnisa, R., Putranto, W. and Nurwati, I. (2023) 'Effect of Black Glutinous Tape Beverage on Malondialdehyde in Metabolic Syndrome Rats', *Jurnal Media Penelitian dan Pengembangan Kesehatan*, 33(4), pp. 147–155.

Mardyansah, D., Nadiroh, A., Rohmawati, Y. and Syahri, L.A. (2020) 'Pengaruh Lama Waktu Pemasakan Dan Konsentrasi Ragi Terhadap Karakteristik Organoleptik Dan Kadar Alkohol Tape Ubi Ungu', *Jurnal Pangan dan Agroindustri*, 8(2), pp. 104–110. Available at: https://doi.org/10.21776/ub.jpa.2020.008.02.6.

Mardyansah, D., Nadiroh, A., Rohmawati, Y. and Syahri, A.L. (2020) 'The Effect of Cooking Time and Yeast Concentration on Quality of Purple Sweet Potato Tape', *Jurnal Pangan dan Agroindustri*, 8(2), pp. 104–110.

Marliza, H., Sammulia, S.F. and Mayefis, D. (2023) 'Analisis Proksimat Dan Skrining Fitokimia Tumbuhan Di Perairan Pantai Sekilak Kota Batam', *The Journal General Health and Pharmaceutical Sciences Research*, 1(2), pp. 41–54.

Nasria, Tellu, A.T. and Nurdin, M. (2024) 'Analisis Proksimat Umbut Rotan Noko (Daemonorps Robusta)', *Jurnal Inovasi Global*, 2(3), pp. 445–452. Available at: https://doi.org/10.58344/jig.v2i3.73.

Prawitasari, D.S. (2019) 'Diabetes Melitus dan Antioksidan', *KELUWIH: Jurnal Kesehatan dan Kedokteran*, 1(1), pp. 48–52. Available at: https://doi.org/10.24123/kesdok.v1i1.2496.

Prayitno, D. (2018) 'Mutu Organoleptik Tape Ubi Jalar Kuning (Ipomoea batatas L) Akibat Perbedaan Konsentrasi Ragi (Saccharomyces cerevisiae) Organoleptic Quality of Yellow Sweet Potato Tape (Ipomoea batatas L) Due to Difference in Yeast Concentration (Saccharomyces ce', *Foodscitech*, 1(2), pp. 35–43.

Rejeki, D.S., Alfiraza, E.N. and Kusuma, A.A. (2025) 'Penentuan Kadar Alkohol dari Tapai Ubi Ungu (Ipomea batas (L) Lam) dan Tapai Singokong (Manihot esculenta Crantz) dengan Variasi Waktu Fermentasi', *BHAMADA Jurnal Ilmu dan Teknologi Kesehatan*, 16(1), pp. 22–30.

Rizki Mulia, A.R. and Sitompul, D.A. (2021) 'Pengaruh waktu pengukusan dan lama fermentasi terhadap karakteristik tape ubi jalar ungu (Ipomoea batatas) Effect of steaming time and fermentation time on

characteristics of purple sweet potato tape (Ipomoea batatas)', *AGRILAND Jurnal Ilmu Pertanian*, 9(3), pp. 162–165.

Samsuri, D.A., Samsuri, S. and Kendran, A.A.S. (2020) 'Kadar Glukosa Darah Tikus Putih (Rattus norvegicus) yang Diberikan Ragi Tape', *Indonesia Medicus Veterinus*, 9(4), pp. 531–539. Available at: https://doi.org/10.19087/imv.2020.9.4.531.

Setiawan, R. and Sudiyat, R. (2021) 'Effect of Selection of Additional Food of Black Sticky Rice and Its Processed Products Based on the Marketing Mix on Blood Sugar in Dm Patients At Puskesmas City of Bandung', *International Conference on Interprofessional Health Collaboration and Community Empowerment*, 3(December), pp. 14–19.

Sevina, R. *et al.* (2025) 'Pengaruh Konsentrasi Ragi Terhadap Kualitas Sensori pada Fermentasi Tapai Singkong dan Tapai Ketan', *Juragan (jurnal Argoteknologi)*, 3(2), pp. 38–42.

Suhartatik, N. *et al.* (2013) 'AKTIVITAS ANTIOKSIDAN ANTOSIANIN BERAS KETAN HITAM SELAMA FERMENTASI', *J. Teknol. dan Industri Pangan*, 24(115–119). Available at: https://doi.org/10.6066/jtip.2013.24.1.115.

Taliku, I., Maspeke, P.N. and Une, S. (2021) 'Pengaruh Lama Pengukusan terhadap Aktivitas Antioksidan dan Karakteristik Kimia Tape Ubi Jalar (Ipomoea Batatas L.)', *Jambura Journal of Food Technology*, 3(2), pp. 84–93. Available at: https://doi.org/10.37905/jjft.v3i2.8219.

Triandita, N. *et al.* (2016) 'Perbaikan Status Antioksidan Penderita Diabetes Tipe 2 Dengan Tahu Kedelai Hitam Kaya Serat', *Jurnal Teknologi dan Industri Pangan*, 27(2), pp. 123–130. Available at: https://doi.org/10.6066/jtip.2016.27.2.123.

Yunisa, Y., Suhaera and Sari, S. (2023) 'Analisis Proksimat Bronok (Acaudina Malpadioides)', *The Journal General Health and Pharmaceutical Sciences Research*, 1(2), pp. 31–40.

Yusuf, M. and Anshar, M. (2018) 'Pemeriksaan kadar alkohol pada tapai ketan hitam yang difermentasikan dengan konsentrasi ragi yang berbeda', *Jurnal Medika: Media Ilmiah Analis Kesehatan*, 3, pp. 22–27.

Zatalia, S.R. and Sanusi, H. (2013) 'The role of antioxidants in the pathophysiology, complications, and management of diabetes mellitus.', *Acta medica Indonesiana*, 45(2), pp. 141–147.