Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

EVALUATION OF ANTIOXIDANT ACTIVITY OF YELLOW COCONUT (*Cocos nucifera* L) USING THE DPPH METHOD

EVALUASI AKTIVITAS ANTIOKSIDAN KELAPA KUNING (*Cocos Nucifera* L) DENGAN METODE DPPH

Baihaqi[1], Fatahu[1*], Sakir[1], Andi Laila Nugrawati[1], Ika Rezvani Aprita[2], Sri Agustina[2]

[1]Jurusan Ilmu dan Teknologi Pangan, Fakultas Pertanian, Universitas Halu Oleo, Kendari Sulawesi Tenggara
[2]Politeknik Indonesia Venezuela, Aceh, Indonesia

* Corresponding Email: fatahu@uho.ac.id

Abstract

Yellow coconut (*Cocos nucifera* L) is an underexplored variety with significant potential in the agricultural and food sectors. Unlike regular coconuts, yellow coconuts have a distinct yellow skin and sweeter water. This study evaluates the antioxidant activity of yellow coconut water and flesh using the DPPH (2,2-Diphenyl-1-Picrylhydrazyl) method, which measures the ability to neutralize free radicals. Results indicate that both yellow coconut water and flesh contain bioactive compounds with notable antioxidant properties, though their activities vary depending on concentration. The water showed significant antioxidant activity at higher concentrations, whereas the flesh showed better activity at lower concentrations. The IC50 values for yellow coconut water and flesh were 900.6 ppm and 1342 ppm, respectively, showing that while both parts have promising antioxidant potential, higher concentrations are needed for more effective results. This research provides valuable insights into the potential of yellow coconut as a natural antioxidant source and its implications for food and health product development.

Keywords: *Yellow coconut, antioxidant, functional food, Bioactive Compounds*

Abstrak

Kelapa kuning (*Cocos nucifera* L) adalah varietas kelapa yang memiliki potensi besar namun masih kurang dieksplorasi di sektor pertanian dan industri pangan. Berbeda dengan kelapa biasa, kelapa kuning memiliki kulit berwarna kuning cerah dan air yang lebih manis. Penelitian ini mengevaluasi aktivitas antioksidan pada air dan daging kelapa kuning dengan menggunakan metode DPPH (2,2-Difenil-1-Pikrilhidrazil) yang mengukur kemampuan untuk menetralkan radikal bebas. Hasil penelitian menunjukkan bahwa baik air kelapa kuning maupun dagingnya mengandung senyawa bioaktif dengan sifat antioksidan yang signifikan, meskipun aktivitasnya bervariasi tergantung pada konsentrasi. Air kelapa kuning menunjukkan efek antioksidan yang signifikan pada konsentrasi yang lebih tinggi, sementara daging kelapa menunjukkan aktivitas antioksidan yang lebih baik pada konsentrasi yang lebih rendah. Nilai IC50 untuk air kelapa kuning dan daging kelapa masing-masing adalah 900,6 ppm dan 1342 ppm, yang menunjukkan bahwa meskipun kedua bagian kelapa kuning memiliki potensi antioksidan yang menjanjikan, konsentrasi yang lebih tinggi diperlukan untuk hasil yang lebih efektif. Penelitian ini memberikan wawasan berharga mengenai potensi kelapa kuning sebagai sumber antioksidan alami dan implikasinya untuk pengembangan produk pangan dan kesehatan.

Kata Kunci : Kelapa kuning, antioksidan, pangan fungsional, Senyawa Bioaktif

INTRODUCTION

The yellow coconut (*Cocos nucifera*) is a coconut variety with significant potential but remains underexploited in the agricultural and food industries. Unlike regular coconuts, the yellow coconut is characterized by its bright yellow skin and sweeter water compared to other coconut varieties (Lukiyono & Zain, 2022). Although yellow coconut is well known in tropical regions and is commonly consumed fresh, scientific research on its nutritional content and bioactive compounds, particularly antioxidant activity, is still limited. One of the most interesting bioactive compounds is antioxidants, which play a vital role in combating free radicals in the body and preventing cell damage that can lead to degenerative diseases such as cancer, diabetes, and cardiovascular disease (Martinelli *et al*., 2021).

Antioxidants are compounds that neutralize the harmful effects of free radicals produced by the body's metabolic processes. These free radicals can damage cells and cause oxidative stress, which can trigger the development of various chronic diseases. Oxidative stress is a major cause of degenerative diseases and premature aging. In this context, antioxidants are essential for maintaining the body's defense system against cell damage. Therefore, consuming foods rich in antioxidants is crucial for maintaining health and preventing various diseases (Dewi, 2019).

Coconuts contain several bioactive compounds, including flavonoids, phenols, and ascorbic acid (vitamin C), all of which have potent antioxidant activity. Previous studies have shown that coconut water and flesh contain compounds that are beneficial to health. Despite the unique characteristics of yellow coconuts, research on their antioxidant activity remains scarce. Understanding the antioxidant content of yellow coconuts can provide deeper insights into their functional potential as a natural source for health applications.

Vitamin C, known for its powerful antioxidant properties, is a key component found in fruits and vegetables (Elvira *et al*., 2024). Yellow coconuts are believed to contain higher levels of vitamin C, both in the water and the flesh, compared to regular coconuts. Furthermore, phenolic and flavonoid compounds, also found in coconuts, act as natural antioxidants that protect the body from free radicals (Mela, 2020). Therefore, it is important to conduct a comprehensive analysis of the antioxidant content of yellow coconuts to understand their potential health benefits fully.

Furthermore, the potential of yellow coconut as a source of natural antioxidants with functional value creates opportunities to develop food products and health supplements based on natural ingredients. Various processed products, such as coconut water, coconut oil, and other foods, can be enriched with yellow coconut extract, a valuable source of antioxidants (Baihaqi *et al*., 2025). Research on this antioxidant content can also make significant contributions to the field of food science, supporting efforts to create healthier and more environmentally friendly products.

Through further analysis of the antioxidant content of yellow coconut, it is hoped that empirical data will be generated to support the development of yellow coconut as a functional food ingredient with health benefits. Therefore, this research is highly relevant to exploring the

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

potential of yellow coconut to prevent degenerative diseases and improve the quality of life through the consumption of foods rich in bioactive compounds.

METHODS

Sample Preparation Process

The samples used in this study were young yellow coconuts, which were first cleaned to remove any dirt adhering to their surfaces. After cleaning, the coconut water and pulp were carefully separated. The pulp was then crushed using a blender to achieve a smoother consistency. Meanwhile, the young coconut water was filtered to remove insoluble particles, yielding a clear liquid ready for use in making solutions.

Making Yellow Coconut Standard Solution

A yellow coconut stock solution at 5000 ppm was prepared by weighing 1.25 grams of crushed yellow coconut flesh. This coconut flesh was then dissolved in 4 mL of 96% ethanol. The solution was transferred to a 250 mL volumetric flask and then diluted with distilled water until the volume reached the calibration mark. A series of concentrations of the yellow coconut solution was then prepared at 250 ppm, 500 ppm, 1000 ppm, 1500 ppm, and 2000 ppm by diluting it as required (Andriana & Murtisi, 2018; Sukma *et al*., 2022).

Preparation of Blank Solution

A blank solution was used to compare the sample's absorbance with that of the negative control. A total of 1 mL of 0.25 mM DPPH solution was placed in a test tube, and 3 mL of ethanol PA (pro analysis) was added. The test tube was then covered with aluminum foil to prevent light from affecting it and incubated at room temperature in the dark for 30 minutes. This blank solution was used as a reference for absorbance measurements in the antioxidant test (Molyneux, 2004; Sukma *et al*., 2022).

Antioxidant Test of Yellow Coconut (Nurazizah, 2019)

To test the antioxidant activity of yellow coconut water and flesh, these two sample parts were dissolved separately using ethanol at various concentrations. For each solution concentration, up to 3 mL of water or yellow coconut flesh extract was then transferred to a test tube, and 1 mL of 0.25 mM DPPH reagent was added to each tube. After all the ingredients were mixed, the test tube was shaken until homogeneous to ensure the active ingredient was mixed with DPPH.

The solution was then incubated in the dark at room temperature for 30 minutes to allow the reaction between the sample and DPPH to proceed. After the incubation period, the absorbance of the solution was measured at 517 nm, the optimal wavelength for measuring the DPPH-antioxidant reaction.

Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

Data processing

The absorbance measurements of each sample were compared with those of the blank solution to calculate the percentage decrease in absorbance. The percentage of DPPH inhibition was calculated using the following formula:

$$\%\ Inhibisi = \left(\frac{A_{\text{blanko}} - A_{\text{sampel}}}{A_{\text{blanko}}}\right) \times 100$$

Where:

A_{blanko} is the absorbance of the blank solution,
A_{sampel} is the absorbance of the sample solution.

The DPPH inhibition results for each yellow coconut solution concentration were analyzed to determine the antioxidant capacity of the water and yellow coconut flesh. Antioxidant activity is expressed as IC50, the sample concentration required to inhibit 50% of DPPH activity.

RESULTS AND DISCUSSION

This study aims to analyze the antioxidant activity of yellow coconut water and yellow coconut flesh using the DPPH (2,2-Diphenyl-1-Picrylhydrazyl) method. The analysis showed a significant difference in antioxidant capacity between yellow coconut water and yellow coconut flesh. The data obtained provide an overview of their potential in warding off free radicals and a deeper understanding of the bioactive compounds they contain. As compounds that can eliminate free radicals, antioxidants are very important for maintaining human health by preventing cell damage that can lead to degenerative diseases (Safitri *et al*., 2020).

Table 1. Analysis of Antioxidant Levels in Yellow Coconut Water

Concentration (ppm)	Absorbance (nm)	% Inhibition	IC50
250	0.428	2,0595	
500	0.348	12,1281	
1000	0.306	29,9771	900,608
1500	0.164	62,4714	
2000	0.102	76.6590	

Table 1 shows the results of the antioxidant activity test on yellow coconut water tested using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method. Antioxidant activity was measured by monitoring the decrease in absorbance at 517 nm, the optimal wavelength for measuring the reaction between DPPH and antioxidant compounds (Wilsya *et al*., 2020). The results obtained show a clear relationship between solution concentration and the ability of yellow coconut water to inhibit free radicals.

At a concentration of 250 ppm, the recorded absorbance is 0.428 nm, with an inhibition percentage of 2.06%. These results indicate that at relatively low concentrations, yellow coconut water does not significantly reduce DPPH activity, reflecting its very low antioxidant capacity. This indicates that at this concentration, yellow coconut water is not yet effective at inhibiting DPPH free radicals. However, at this stage, some components in yellow coconut water may have begun to interact with DPPH, although the effect is still very limited.

When the concentration of yellow coconut water increases to 500 ppm, the absorbance decreases to 0.348 nm, and the inhibition percentage increases to 12.13%. This indicates that the higher the concentration of yellow coconut water, the greater its ability to inhibit free radicals. This increase in antioxidant activity is consistent with the theory that higher concentrations yield more antioxidant compounds that can interact with DPPH (Winahyu *et al.*, 2019). This suggests that the active compounds in yellow coconut water have greater potential at higher concentrations, although this remains preliminary.

At a concentration of 1000 ppm, the absorbance decreased to 0.306 nm, and the inhibition percentage increased significantly to 29.98%. At this concentration, yellow coconut water showed a more pronounced effect in neutralizing free radicals. Greater changes in absorbance indicate an increase in the concentration of antioxidant compounds in the sample, which are more effective at reducing DPPH free radicals (Artanti & Lisnasari, 2018). This shows that the compounds in yellow coconut water have good potential to reduce oxidation at higher concentrations.

When the concentration was increased to 1500 ppm, a further decrease in absorbance was observed at 0.164 nm, and the inhibition percentage reached 62.47%. At this point, yellow coconut water showed a more pronounced antioxidant potential, likely due to the greater number of active compounds that interact with free radicals. This greater effect reflects the increased concentration of antioxidant compounds in yellow coconut water, which can bind and neutralize free radicals more effectively.

At a concentration of 2000 ppm, the decrease in absorbance was 0.102 nm, and the inhibition percentage reached 76.66%, demonstrating excellent DPPH free radical scavenging ability. These results indicate that high concentrations of yellow coconut water can almost completely neutralize existing free radicals. This high scavenging ability is likely due to the abundance of antioxidant compounds that neutralize free radicals (Ikhrar *et al.*, 2019).

The IC50 for yellow coconut water was 900.608 ppm, meaning that this concentration can inhibit 50% of DPPH activity. The IC50 value is higher, indicating that yellow coconut water requires a relatively high concentration to achieve half of its maximum effect. Although this IC50 is quite good, a lower value would be more advantageous because it indicates that the compounds in yellow coconut water are more effective at lower concentrations (Setiawan *et al.*, 2018).

Overall, the results show that Yellow coconut water has good antioxidant activity, although it requires relatively high concentrations to produce a significant effect. These results suggest that yellow coconut water can be used as a natural source of antioxidants. However, it is less effective than other antioxidants, which require lower concentrations to achieve the same effect.

Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

Table 2. Analysis of Antioxidant Levels in Yellow Coconut Flesh

Concentration (ppm)	Absorbance (nm)	% Inhibition	IC50
250	0.346	20,8238	
500	0.310	29,0618	
1000	0.275	37,0709	1342
1500	0.212	51,4874	
2000	0.126	71,1670	

Table 2 shows the results of the antioxidant activity test on yellow coconut meat, using the DPPH method to measure the ability of coconut flesh to inhibit free radicals. Similar to yellow coconut water, measurements were conducted at various concentrations of the yellow coconut flesh solution. The results showed that yellow coconut flesh can neutralize DPPH free radicals, albeit at higher concentrations than yellow coconut water.

At a concentration of 250 ppm, the recorded absorbance is 0.346 nm, with an inhibition percentage of 20.82%. These results indicate that yellow coconut flesh at low concentrations has higher antioxidant activity than yellow coconut water at the same concentration. However, this relatively low inhibition percentage indicates that at low concentrations, yellow coconut flesh has little ability to inhibit DPPH activity.

At a concentration of 500 ppm, the absorbance decreased to 0.310 nm, and the inhibition percentage increased to 29.06%. This increase indicates that yellow coconut flesh is more effective at neutralizing free radicals, although the rate of increase is slower than that of yellow coconut water. This indicates that although yellow coconut flesh has higher antioxidant potential at the same concentration, its increase is slower than that of yellow coconut water.

At a concentration of 1000 ppm, the inhibition percentage increased to 37.07% with an absorbance of 0.275 nm, indicating that yellow coconut flesh is increasingly effective at reducing free radicals. This larger increase indicates that at higher concentrations, the antioxidant compounds in yellow coconut flesh become more effective (Kamoda *et al*., 2021).

At a concentration of 1500 ppm, the inhibition percentage increased to 51.49%, with an absorbance of 0.212 nm, indicating that yellow coconut flesh is increasingly effective at reducing free radicals. This indicates that more antioxidant compounds can bind free radicals, resulting in a stronger antioxidant effect (Jayanto, 2024).

At a concentration of 2000 ppm, the inhibition percentage reached 71.17%, and the absorbance decreased to 0.126 nm, indicating that high concentrations of yellow coconut flesh can neutralize most of the DPPH free radicals present. However, this is still lower than that of yellow coconut water at the same concentration, indicating that higher concentrations of yellow coconut flesh are required to produce optimal antioxidant effects.

The IC50 for yellow coconut meat is 1342 ppm, higher than that of yellow coconut water (IC50 = 900.608 ppm). This higher IC50 value indicates that yellow coconut flesh requires a higher concentration to achieve half its antioxidant effect. This suggests that although yellow

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

coconut flesh has good antioxidant potential, its effects are more limited at lower concentrations than those of yellow coconut water.

CONCLUSION

Overall, both yellow coconut water and coconut flesh contain bioactive compounds with antioxidant activity, albeit at different capacities. Yellow coconut water showed a significant increase in antioxidant activity at higher concentrations, but with a higher IC_{50}, indicating weaker antioxidant capacity. On the other hand, yellow coconut flesh had a greater free radical-inhibiting capacity at lower concentrations, although its higher IC_{50} value indicated lower effectiveness than that of other antioxidant sources.

These findings provide a deeper understanding of the potential of yellow coconut as a source of natural ingredients with antioxidant activity. Further research is needed to explore the bioactive compounds in yellow coconut and to optimize extraction methods to enhance its functional potential for health and food industry applications.

REFERENCES

Artanti, A. N., & Lisnasari, R. (2018). Uji Aktivitas Antioksidan Ektrak Ethanol Daun Family Solanum Menggunakan Metode Reduksi Radikal Bebas DPPH. *Journal of Pharmaceutical Science and Clinical Research*, *2*(3), 62–69.

Baihaqi, B., Asrul, A., Windayani, W., Bahar, H., Putra, A., Ladianto, A. J., ... & Qadri, M. S. (2025). Pelatihan Pengolahan Kelapa Menjadi Virgin Coconut Oil (VCO) di Desa Tridama Mulya Kecamatan Landono Kabupaten Konawe Selatan. *Jurnal Pengabdian Masyarakat Wallacea*, *1*(1), 1–11.

Dewi, A. D. R. (2019). Aktivitas Antioksidan dan Antibakteri Ekstrak Kulit Jeruk Manis dan Aplikasinya Sebagai Pengawet Pangan. *Jurnal Teknologi & Industri Pangan*, *30*(1), 83–90.

Elvira, I., Baihaqi, B., Faradilla, R. F., Rejeki, S., & Suci, I. A. (2024). Pengaruh Metode Pengolahan Terhadap Kadar Air, Kadar Abu, dan Kandungan Vitamin C Daun Kelor (*Moringa Oleifera*). *Jurnal Agrosains Universitas Panca Bhakti*, *17*(1), 9–14.

Ikhrar, M. S., Yudistira, A., & Wewengkang, D. S. (2019). Uji Aktivitas Antioksidan Stylissa sp. dengan Metode DPPH (1, 1-difenil-2-pikrilhidrazil). *Pharmacon*, *8*(4), 961–967.

Jayanto, I. (2024). Uji Aktivitas Antioksidan Ekstrak Etil Asetat Daun Matoa Menggunakan Radikal Bebas DPPH (DiphenylPicrylhydrazil). *PHARMACON*, *13*(2), 611–618.

Kamoda, A. P., Nindatu, M., Kusadhiani, I., Astuty, E., Rahawarin, H., & Asmin, E. (2021). Uji aktivitas antioksidan alga cokelat saragassum sp. dengan metode 1, 1-difenil-2-pikrihidrasil (dpph). *PAMERI: Pattimura Medical Review*, *3*(1), 60–72.

Lukiyono, Y. T., & Zain, S. S. (2022). Potensi Air Kelapa Kuning (Cocos Nucifera L.) Untuk Meminimalisasi Kadar Logam Berat Timbal (Pb) Pada Kerang Hijau (*Perna Viridis*). *Prosiding Asosiasi Institusi Pendidikan Tinggi Teknologi Laboratorium Medik Indonesia*, 1, 239–262.

https://jurnal.rocewisdomaceh.com/index.php/roce e-ISSN : 3032-4505
Vol. 3, No. 1, Thn. 2026
https://doi.org/10.71275/roce.v3i1.171

Martinelli, E., Granato, D., Azevedo, L., Gonçalves, J. E., Lorenzo, J. M., Munekata, P. E., ... & Lucini, L. (2021). Current perspectives on cell-based approaches to defining antioxidant activity in food. *Trends in Food Science & Technology*, *116*, 232–243.

Mela, E. (2020). Diversifikasi produk pangan berbasis air kelapa. *Agritech: Jurnal Fakultas Pertanian Universitas Muhammadiyah Purwokerto*, *22*(2), 163–175.

Nurazizah, L. L. (2019). *Pengaruh Penambahan Air Kelapa Hijau (Cocos nucifera L. Var. Varidis) terhadap Aktivitas Antioksidan, BK, Viskositas, dan pH Yoghurt* (Doctoral dissertation, Universitas Brawijaya).

Safitri, F. W., Ahwan, A., & Qonitah, F. (2020). *Uji aktivitas antioksidan ekstrak etanol daun adas (Foeniculum vulgare Mill) dengan metode DPPH dan FRAP* (Doctoral dissertation, Universitas Sahid Surakarta).

Setiawan, F., Yunita, O., & Kurniawan, A. (2018). Uji aktivitas antioksidan ekstrak etanol kayu secang (Caesalpinia sappan) menggunakan metode DPPH, ABTS, dan FRAP. *Media Pharmaceutica Indonesiana*, *2*(2), 82–89.

Wilsya, M., Hardiansyah, S. C., & Sari, D. P. (2020). Formulasi Dan Uji Aktivitas Antioksidan Lotion Ekstrak Daun Gandarusa (Justicia Gendarussa Burm F.). *Jurnal Kesehatan: Jurnal Ilmiah Multi Sciences*, *10*(02), 105–115.

Winahyu, D. A., Purnama, R. C., & Setiawati, M. Y. (2019). Uji aktivitas antioksidan pada ekstrak kulit buah naga merah (*Hylocereus polyrhizus*) dengan metode DPPH. *Jurnal Analis Farmasi*, *4*(2), 117–121.