

**PENGARUH JENIS PELARUT DAN WAKTU ULTRASONIKASI
TERHADAP INTENSITAS WARNA DAN AKTIVITAS ANTIOKSIDAN
BUNGA TELANG (*Clitoria ternatea L.*)**

SKRIPSI

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana Sains
di Bidang Kimia



Oleh :

Chelsea Pasaribu

1604563

**PROGRAM STUDI KIMIA
DEPARTEMEN PENDIDIKAN KIMIA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN INDONESIA
BANDUNG
2022**

**PENGARUH JENIS PELARUT DAN WAKTU ULTRASONIKASI
TERHADAP INTENSITAS WARNA DAN AKTIVITAS ANTIOKSIDAN
BUNGA TELANG (*Clitoria ternatea L.*)**

Oleh
Chelsea Pasaribu
1604563

Skripsi ini diajukan untuk memenuhi salah satu syarat memperoleh gelas Sarjana
Sains pada Program Studi Kimia Fakultas Pendidikan Matematika dan Ilmu
Pengetahuan Alam

©Chelsea Pasaribu
Universitas Pendidikan Indonesia
Desember 2022

Hak cipta dilindungi undang-undang
Skripsi ini tidak boleh diperbanyak seluruhnya atau sebagian, dengan dicetak
ulang, di *fotocopy*, atau cara lainnya tanpa izin dari penulis

CHELSEA PASARIBU

**PENGARUH JENIS PELARUT DAN WAKTU ULTRASONIKASI
TERHADAP INTENSITAS WARNA DAN AKTIVITAS ANTIOKSIDAN
BUNGA TELANG (*Clitoria ternatea* L.)**

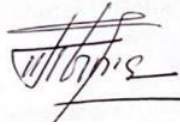
Disetujui dan disahkan oleh pembimbing :

Pembimbing I



Dra. Zackiyah, M.Si
NIP. 195912291991012001

Pembimbing II



Dr. F. M. Titin Supriyanti, M.Si
NIP. 195810141986012001

Mengetahui,
Ketua Departemen Pendidikan Kimia
FPMIPA UPI



Dr. Hendrawan, M. Si
NIP. 196309111989011001

ABSTRAK

Bunga telang merupakan salah satu tanaman hias yang mengandung banyak senyawa bioaktif yang memiliki potensi sebagai pewarna alami dan antioksidan alami, diantaranya antosianin, flavonoid, kaempferol, tanin, dan kuersetin. Isolasi zat warna dari bunga telang dapat dilakukan dengan metode ekstraksi, salah satunya adalah ultrasonikasi. Metode ekstraksi tersebut memiliki kelebihan dibandingkan dengan metode ekstraksi lain, baik dalam waktu ekstraksi dan hasil perolehan ekstraksi. Pada ekstraksi zat warna bunga telang perlu memperhatikan beberapa faktor, yaitu jenis pelarut dan waktu ekstraksi karena mempengaruhi hasil perolehan ekstraksi. Penelitian ini dilakukan dengan tujuan untuk mengetahui pengaruh jenis pelarut dan waktu ultrasonikasi terhadap intensitas warna dan aktivitas antioksidan bunga telang. Isolasi ekstrak bunga telang dilakukan dengan menggunakan metode ultrasonikasi, pelarut akuades, asam asetat, dan asam sitrat, dengan waktu ultrasonikasi 30 menit, 45 menit, dan 60 menit. Pengujian kualitatif dilakukan dengan uji fitokimia dan pengujian kuantitatif dilakukan dengan uji intensitas warna, uji total residu, dan uji aktivitas antioksidan. Berdasarkan hasil penelitian jenis pelarut dan waktu ultrasonikasi yang berbeda dapat mempengaruhi efisiensi perolehan zat warna alami pada bunga telang. Penggunaan pelarut berbeda, ultrasonikasi, dan waktu ultrasonikasi berbeda akan menghasilkan intensitas warna dan aktivitas antioksidan yang berbeda. Hasil penelitian menunjukkan bahwa ekstrak bunga telang dengan pelarut asam asetat pada waktu ultrasonikasi 60 menit menghasilkan intensitas warna dan aktivitas antioksidan terbaik, yaitu nilai intensitas warna sebesar 2,81 dengan aktivitas antioksidan sebesar 59,13%. Ekstrak bunga telang pelarut asam asetat pada waktu ultrasonikasi 60 menit termasuk dalam antioksidan kuat dengan nilai IC_{50} terhadap DPPH 57,095 mg/L.

Kata kunci : aktivitas antioksidan, bunga telang, ekstraksi, pelarut, ultrasonikasi.

ABSTRACT

Butterfly pea flower is an ornamental plant that contains many bioactive compounds that have potential as natural dyes and natural antioxidants, including anthocyanins, flavonoids, kaempferol, tannins, and quercetin. Isolation of dyes from butterfly pea flowers can be done by extraction methods, one of which is ultrasonication. This extraction method has advantages compared to other extraction methods, both in extraction time and extraction yield. In the extraction of butterfly pea flower dyes, several factors need to be considered, namely the type of solvent and extraction time because they affect the extraction yield. This research was conducted with the aim to determine the effect of the type of solvent and ultrasonication time on the color intensity and antioxidant activity of butterfly pea flowers. The isolation of the butterfly pea flower extract was carried out using the ultrasonication method, using distilled water, acetic acid, and citric acid, with ultrasonication times of 30 minutes, 45 minutes, and 60 minutes. Qualitative testing was carried out by means of a phytochemical test and quantitative testing was carried out by testing the color intensity, total residue test, and antioxidant activity test. Based on the research results, different types of solvents and ultrasonication times can affect the efficiency of obtaining natural dyes in butterfly pea flowers. The use of different solvents, ultrasonication, and different ultrasonication times will produce different color intensities and antioxidant activities. The results showed that the extract of the butterfly pea flower with acetic acid solvent at 60 minutes of ultrasonication produced the best color intensity and antioxidant activity, namely the color intensity value of 2.81 with an antioxidant activity of 59.13%. Butterfly pea flower extract with acetic acid solvent at 60 minutes ultrasonication time is included in the strong antioxidant with an IC50 value to DPPH of 57.095 mg/L.

Keyword : *antioxidant activity, butterfly pea flower, extraction, solvent, ultrasonication*

DAFTAR ISI

KATA PENGANTAR	Error! Bookmark not defined.
UCAPAN TERIMA KASIH	Error! Bookmark not defined.
ABSTRAK	iii
ABSTRACT	iv
DAFTAR ISI	v
DAFTAR TABEL	Error! Bookmark not defined.
DAFTAR GAMBAR	Error! Bookmark not defined.
PENDAHULUAN	Error! Bookmark not defined.
1.1 Latar Belakang	Error! Bookmark not defined.
1.2 Rumusan Masalah	Error! Bookmark not defined.
1.3 Batasan Penelitian	Error! Bookmark not defined.
1.4 Tujuan Penelitian	Error! Bookmark not defined.
1.5 Manfaat Penelitian	Error! Bookmark not defined.
1.6 Struktur Organisasi Skripsi	Error! Bookmark not defined.
TINJAUAN PUSTAKA	Error! Bookmark not defined.
2.1 Bunga Telang	Error! Bookmark not defined.
2.2 Zat Warna Alami Bunga Telang	Error! Bookmark not defined.
2.3 Antioksidan Bunga Telang	Error! Bookmark not defined.
2.4 Ekstraksi Bunga Telang	Error! Bookmark not defined.
METODE PENELITIAN	Error! Bookmark not defined.
3.1 Waktu dan Tempat Pelaksanaan Penelitian	Error! Bookmark not defined.
3.2 Alat dan Bahan	Error! Bookmark not defined.
3.3 Bagan Alir Penelitian	Error! Bookmark not defined.
3.4 Cara Kerja	Error! Bookmark not defined.
HASIL DAN PEMBAHASAN	Error! Bookmark not defined.
4.1 Isolasi Zat Warna Bunga Telang	Error! Bookmark not defined.
4.2 Analisis Fitokimia	Error! Bookmark not defined.

4.3	Perolehan Total Residu	Error! Bookmark not defined.
4.4	Intensitas Warna Bunga Telang	Error! Bookmark not defined.
4.5	Aktivitas Antioksidan Bunga Telang	Error! Bookmark not defined.
KESIMPULAN DAN SARAN		Error! Bookmark not defined.
5.1	Kesimpulan.....	Error! Bookmark not defined.
5.2	Saran	Error! Bookmark not defined.
DAFTAR PUSTAKA		41
LAMPIRAN		Error! Bookmark not defined.

DAFTAR PUSTAKA

- Antihika, B., P. S., Kusumocahyo, & Sutatanto, H. (2015). Ultrasonic Approach In Clitoria Ternate (Butterfly Pea) Extraction in Water and Extract Sterilization by Ultrafiltration for Eye Drop Active Ingredient. *Procedia Chemistry*, 16(6), 237–244.
- Buchweitz, M., Nagel, A., Carle, R., and Kammerer, D. R. (2012). Characterisation Of Sugar Beet Pectin Fractions Providing Enhanced Stability Of Anthocyaninbased Natural Blue Food Colourants. *Food Chem.* 132, 1971–1979.
- Budiasih, K. S. (2017). Prosiding Seminar Nasional Kimia UNY 2017 Sinergi Penelitian dan Pembelajaran untuk Mendukung Pengembangan Literasi Kimia pada Era Global Ruang Seminar FMIPA UNY, 14 Oktober 2017. *Jurnal Prosiding*, (4), 201–206.
- CABI. (2016). Clitoria Ternatea (Butterfly Pea). CABI Compendium
- Chemat, F., et al. (2019). Review of Alternative Solvents For Green Extraction Of Food And Natural Products: Panorama, Principles, Applications And Prospects. *Molecules*, 24:3007
- Escher. (2020). Clitoria Ternatea L. Petal Bioactive Compounds Display Antioxidant, Antihemolytic and Antihypertensive Effects, Inhibit a Amylase and A-Glucosidase Activities and Reduce Human LDL Cholesterol and DNA Induced Oxidation. *Food Res International*, 128:108763.
- Escher, G. B., et al. (2020). Phenolic Composition by UHPLC-Q-TOF-MS/MS and Stability of Anthocyanins From Clitoria Ternatea L. (Butterfly Pea) Blue Petals. *Food Chemistry*. Elsevier Ltd, 331, 127341.
- FDA. (2015). Summary of Color Additives for Use in the United States in Foods, Drugs, Cosmetics, and Medical Devices. Silver Spring, MD: FDA
- Handito, D., Basuki, E., Saloko, S. (2022). Analisis Komposisi Bunga Telang (*Clitoria ternatea*) sebagai Antioksidan Alami pada Produk Pangan. Mataram : LPPM Universitas Mataram.

- Hartono, M. A., Purwijantiningsih, L. M. E. and Pranata, S. (2012) ‘Pemanfaatan Ekstrak Bunga Telang (*Clitoria Ternatea L.*) Sebagai Pewarna Alami Es Lilin. 1–15
- Jamil N, Zairi MNM, Nasim NAIM, et, al. (2018). Influences of Environmental Conditions to Phytoconstituents in *Clitoria Ternatea* (Butterfly Pea Flower): A Review. *J Sci Technology*, 10:208–228
- Kazuma, K., N. Noda dan M. Suzuki. 2003. Flavonoid Composition Related to Petal Color in Different Lines of *Clitoria ternatea*. *Phytochemistry* 64(6): 1133-1139.
- Khoo, H. E., Azlan, A., Tang, S. T., and Lim, S. M. (2017). Anthocyanidins and anthocyanins: colored pigments as food, pharmaceutical ingredients, and the potential health benefits. *Food Nutrition*, 61:1361779.
- Marpaung, A., Hariyadi, P., & Faridah, D. N. (2018). The Wide Variation of Color Stability of Butterfly Pea (*Clitoria ternatea L.*) Flower Extract at pH 6-8 the Wide Variation of Color Stability of Butterfly pea (*clitoria ternatea l.*) Flower Extracts at PH 6-8. (October).
- Marpaung, A. M., Lee, M., and Kartawiria, I. S. (2020). The Development Of Butterfly Pea (*Clitoria Ternatea*) Flower Powder Drink By Co-Crystallization. *Indonesia Food Sci. Technol. J.* 3, 34–37.
- Marsin, A. (2020). Microwave-Assisted Encapsulation Of Blue Pea Flower (*Clitoria Ternatea*) Colourant: Maltodextrin Concentration, Power, And Time. *Chem. Eng. Trans.* 78, 199–204.
- Mehmood, A., Ishaq, M., Zhao, L., Yaqoob, S., Safdar, B., Nadeem, M., Munird, M. and Wang, C. (2019). Impact of Ultrasound and Conventional Extraction Techniques on Bioactive Compounds and Biological Activities of Blue Butterfly Pea Flower (*Clitoria ternatea L.*) *Ultrasonics Sonochemistry*, 51: 12-9
- Mukherjee, P. K. *et al.* (2008) ‘The Ayurvedic Medicine *Clitoria Ternatea*-From Traditional Use to Scientific Assessment’, *Journal of Ethnopharmacology*, 120(3), 291–301.
- Mukhriani. (2014). Ekstraksi, pemisahan senyawa, dan identifikasi senyawa aktif. *Jurnal Kesehatan*, 7(2), 361–367.
- Nguyen, et al. (2019). Extraction Of Anthocyanins From Butterfly Pea (*Clitoria Ternatea L.* Flowers) In Southern Vietnam: Response Surface Modeling

- For Optimization Of The Operation Conditions. *Proceedings of the 2018 the 6th International Conference on Mechanical Engineering, IOP Conference Series: Materials Science and Civil Engineering*.
- Patra, A. (2021). Application Of Artificial Neural Network-Genetic Algorithm And Response Surface Methodology For Optimization Of Ultrasoundassisted Extraction Of Phenolic Compounds From Cashew Apple Bagasse. *Journal of Food Process Engineering*.
- Pham, T. N. *et al.* (2019) 'Effect of Various Factors on Extraction Efficiency of Total Anthocyanins from Butterfly Pea (*Clitoria Ternatea L. Flowers*) In Southern Vietnam', *IOP Conference Series: Materials Science and Engineering*, 544(1).
- Purwaniati. (2020). Analysis Of Total Anthocyanin Content In Telang Flowers Preparations (*Clitoria Ternatea*) With Ph Differential Method Using Visible Spectrophotometry. *Jurnal Farmagazine*, VII(1), 18-23.
- Rocha, et al. (2020). Extraction Of Anthocyanins From Red Raspberry For Natural Food Colorants Development: Processes Optimization And *In Vitro* Bioactivity. *Processes* 8:1447.
- Setyantoro, M., Haslina. (2019). The Effect of Time of Extraction with Ultrasonic Methods on the Content of Vitamin C, Protein and Phytochemicals of Corn Hair Extract (*Zea Mays L.*). Semarang: Universitas Semarang.
- Shen, et al. (2019). Effects Of Different Solvents On Total Phenolic And Total Anthocyanin Contents Of *Clitoria Ternatea L.* Petal And Their Anti-Cholesterol Oxidation Capabilities. *Int. J. Food Sci. Technol.* 54:424431
- Sumartini, Yusep, Fauzan,. (2022). Analisis Bunga Telang (*Clitoria Ternatea*) dengan Variasi Ph Metode Liquid Chromatograph-Tandem Mass Spectrometry (LC-MS/MS). *Pasundan Food Technology Journal*, 7(2) : 70-77.
- Syafa'Atullah, A. Q. *et al.* (2020) 'Anthocyanin From Butterfly Pea Flowers (*Clitoria Ternatea*) by Ultrasonic-Assisted Extraction', *AIP Conference Proceedings*, 2237.
- Winarno, G. (1997). *Kimia Pangan dan Gizi*. Jakarta: Gramedia Pustaka Utama.

Zussiva, A., Bertha, K. L. and Budiyati, C. S. (2012) 'Ekstraksi dan Analisis Zat Warna Biru (Anthosianin Anthosianin) dari Bunga Telang (*Clitoria Ternatea*) Sebagai Pewarna Alami', *Jurnal Teknologi Kimia dan Industri*, 1(1), 356–365.