

DAFTAR PUSTAKA

1. Ayu Putu Widiastriani I, Udayani NNW, Putri Triansyah GA, Mahita Kumari Dewi NPE, Eva Wulandari NLW, Sri Prabandari AAS. Artikel Review: Peran Antioksidan Flavonoid dalam Menghambat Radikal Bebas. *Journal Syifa Sciences and Clinical Research*. 2024;6(2):188–97.
2. Umboro RO, S DEB, Yanti NKW. Uji Efektivitas Antioksidan (Ic50) Dan Toksisitas Akut (Ld50) Fraksi Etanol Daun Nangka (*Artocarpus Heterophyllus* Lam.). *JUPE : Jurnal Pendidikan Mandala*. 2020;5(6).
3. Radical F, Activity S, Alsophila OF, Sm J. Aktivitas Penangkap Radikal Bebas Dari Batang Pakis (*Alsophila glauca* J. Sm). *Majalah Obat Tradisional*, 16(3). 2011;16(3):156–60.
4. Ren J, Li Z, Li X, Yang L, Bu Z, Wu Y, dkk. Exploring the Mechanisms of the Antioxidants BHA, BHT, and TBHQ in Hepatotoxicity, Nephrotoxicity, and Neurotoxicity from the Perspective of Network Toxicology. *Foods*. 2025;14(7):1095.
5. Ningrum TS, Purba R, Pasaribu SP. Mini Review : Comparison Of Antioxidant Activity Of Several Species Of Betel Leaves (*Piper* sp.) And Their Potential As Sunscreen. Dalam: *Prosiding Seminar Nasional Kimia*. 2024. hlm. 235–8.
6. Alam B, Akter F, Parvin N, Sharmin Pia R, Akter S, Chowdhury J, dkk. Antioxidant, analgesic and anti-inflammatory activities of the methanolic extract of *Piper betle* leaves. *Avicenna journal of phytomedicine*. 2013;3(2):112–25.
7. Ali A, Lim XY, Chong CH, Mah SH, Chua BL. Optimization of ultrasound-assisted extraction of natural antioxidants from *Piper betle* using response surface methodology. *Lwt*. 2018;89:681–8.
8. Suarantika F, Patricia VM, Rahma H. Optimization of Green Betel Leaf (*Piper betle* L.) Extraction Process Through Empirical-based Antioxidant Activity. *Jurnal Ilmiah Medicamento*. 2023;9(1):16–21.

9. Rohaeti E, Karunina F, Rafi M. Ftir-based fingerprinting and chemometrics for rapid investigation of antioxidant activity from *Syzygium polyanthum* extracts. Indonesian Journal of Chemistry. 2021;21(1):128–36.
10. Damayanti AA, Trisnawati NLP, Suyanto H. Identifikasi Bilangan Gelombang Daun Sirih (*Piper sp.*) Menggunakan Metode Spektroskopi Fourier Transform Infrared (FTIR) dan Principal Component Analysis (PCA). Buletin Fisika. 2020;22(2):60.
11. Djanas VB, Fatimawali, Suoth EJ. Analisis Sidik Jari Buah Sirih (*Piper betle* L.) Sebagai Bahan Baku Obat Tradisional Dengan Spektroskopi FTIR. Pharmacon. 2023;12(2):193–8.
12. Husein SG, Firmansyah A, Yusuf FF. Analisis Kemometrika Spektrum Fourier Transformed Infrared (FTIR) Dari Minyak Nabati. Jurnal Sains dan Teknologi Farmasi Indonesia. 2020;9(2):45.
13. I Gusti Ayu Ari Agung, Hervina, Sandi NWA. Nutrisi Dan Zat Bioaktif Daun Sirih (*Piper betle* L.), Kesehatan Gigi Dan Mulut, Serta COVID-19. Universitas Mahasaraswati Press. 2021. 1–50 hlm.
14. Rahmawati N, Mujahid R, Widiyastuti Y. Budidaya dan Manfaat Sirih untuk Kesehatan. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI. 2020. 1–122 hlm.
15. Farid Hossain Md. Uses Impact of Betel Leaf (*Piper betle* L.) on Public Health. Science Journal of Public Health. 2017;5(6):408.
16. Shah SK, Garg G, Jhade D, Patel N. *Piper betle*: Phytochemical, pharmacological and nutritional value in health management. International Journal of Pharmaceutical Sciences Review and Research. 2016;38(2):181–9.
17. Azahar NI, Mokhtar NM, Arifin MA. *Piper betle*: a review on its bioactive compounds, pharmacological properties, and extraction process. IOP Conference Series: Materials Science and Engineering. 2020;991(1).
18. Prakash B, Shukla R, Singh P, Kumar A, Mishra PK, Dubey NK. Efficacy of chemically characterized *Piper betle* L. essential oil against fungal and aflatoxin contamination of some edible commodities and its antioxidant activity. International Journal of Food Microbiology. 2010;142(1–2):114–9.

19. Madhumita M, Guha P, Nag A. Extraction of betel leaves (*Piper betle* L.) essential oil and its bio-actives identification: Process optimization, GC-MS analysis and anti-microbial activity. *Industrial Crops and Products*. 2019;138(July):111578.
20. P. Geetha VS and MB. Quantification of Bioactive Compounds in *Piper betle* Leaf Extract by Gas Chromatography-Mass Spectrometry (GC-MS). *Madras Agricultural Journal*. 2022;109(Special):1199–203.
21. Phensri P, Thummasema K, Sukatta U, Morand S, Pruksakorn C. In Vitro Antimicrobial Activity of *Piper betle* Leaf Extract and Some Topical Agents against Methicillin-Resistant and Methicillin-Susceptible Staphylococcus Strains from Canine Pyoderma. *Animals*. 2022;12(22).
22. Purba RAP, Paengkoum P. Bioanalytical HPLC method of *Piper betle* L. for quantifying phenolic compound, water-soluble vitamin, and essential oil in five different solvent extracts. *Journal of Applied Pharmaceutical Science*. 2019;9(5):33–9.
23. Biswas P, Anand U, Saha SC, Kant N, Mishra T, Masih H, dkk. Betelvine (*Piper betle* L.): A comprehensive insight into its ethnopharmacology, phytochemistry, and pharmacological, biomedical and therapeutic attributes. *Journal of Cellular and Molecular Medicine*. 2022;26(11):3083–119.
24. Abdullah NF, Hussain RM. Isolation of allylpyrocatechol from *Piper betle* L. leaves by using high-performance liquid chromatography. *Journal of Liquid Chromatography and Related Technologies*. 2015;38(2):289–93.
25. Seo J, Lee U, Seo S, Eru A, Bunga O, Lee K, dkk. Anti-inflammatory and antioxidant activities of methanol extract of *Piper betle* Linn. (*Piper betle* L.) leaves and stems by inhibiting NF- κ B/MAPK/Nrf2 signaling pathways in RAW 264.7 macrophages. *Biomedicine & Pharmacotherapy*. 2022;155.
26. Gundala SR, Aneja R. Piper Betel Leaf: A Reservoir of Potential Xenohormetic Nutraceuticals with Cancer-Fighting Properties. *Cancer Prevention Research*. 2014;7(5):477–86.
27. Kulnanan P, Chuprom J, Thomrongsuwannakij T, Romyasamit C, Sangkanu S, Manin N, dkk. Antibacterial, antibiofilm, and anti-adhesion activities of

- Piper betle* leaf extract against Avian pathogenic *Escherichia coli*. Archives of Microbiology. 2022;204(1):1–14.
28. Madhumita M, Guha P, Nag A. Bio-actives of betel leaf (*Piper betle* L.): A comprehensive review on extraction, isolation, characterization, and biological activity. Phytotherapy Research. 2020;34(10):2609–27.
 29. Nur Sazwi N, Nalina T, Rahim ZHA. Antioxidant and cytoprotective activities of *Piper betle*, *Areca catechu*, *Uncaria gambir* and betel quid with and without calcium hydroxide. BMC Complementary and Alternative Medicine. 2013;13.
 30. Savsani H, Srivastava A, Gupta S, Patel K. Strengthening antioxidant defense & cardio protection by *Piper betle*: An in-vitro study. Heliyon. 2020;6(1).
 31. Ronaldo L, Putri NEK, Narsa AC. Kajian Literatur: Aktivitas Anti-Inflamasi, Antibakteri, dan Antioksidan Dari Tanaman Genus Piper Spesies Sirih Merah (*Piper crocatum*) dan Sirih Hijau (*Piper betle* L.). Jurnal Mandala Pharmacon Indonesia. 2024;10(1):61–7.
 32. Kementerian Kesehatan RI. Farmakope Herbal Indonesia Herbal. Kementrian Kesehatan Indonesia. 2017. 307–310 hlm.
 33. RI B. Pedoman Penyiapan Bahan Baku Obat Bahan Alam Berbasis Ekstrak/Fraksi. Badan Pengawas Obat dan Makanan RI. 2023;(November):45.
 34. Dias ALB, de Aguiar AC, Rostagno MA. Extraction of natural products using supercritical fluids and pressurized liquids assisted by ultrasound: Current status and trends. Ultrasonics Sonochemistry. 2021;74.
 35. Wahyuningsih S, Yunita I, Sundari UY, Nurmalasari E, Suryandani H, Pagalla DB, dkk. Ekstraksi Bahan Alam. Researchgate. 2024. 16–19 hlm.
 36. Nugroho A. Buku Ajar: Teknologi Bahan Alam. Lambung Mangkurat University Press. 2017. 155 hlm.
 37. Arrofiqi MR, Sakti AS, Mayangsari FD. Kajian Literatur: Aplikasi Sejumlah Metode Ekstraksi Konvensional untuk Mengekstraksi Senyawa Fenolik dari Bahan Alam. Jurnal Penelitian Farmasi & Herbal. 2024;7(1):8–24.
 38. Putri CN, Rahardhian MRR, Ramonah D. Pengaruh Metode Ekstraksi Terhadap Kadar Total Fenol dan Total Flavonoid Esktrak Etanol Daun Insulin (*Smallanthus sonchifolius*) serta Aktivitas Antibakteri Terhadap

- Staphylococcus aureus*. JPSCR: Journal of Pharmaceutical Science and Clinical Research. 2022;7(1):15.
39. A. A. Bawa Putra, N. W. Bogoriani, N. P. Diantariani dan NLUS. Ekstraksi Zat Warna Alam Dari Bonggol Tanaman Pisang (*Musa paradisiaca* L.) Dengan Metode Maserasi, Refluks, Dan Sokletasi. The Synergist. 2014;13(3):27.
 40. Atun S. Metode Isolasi dan Identifikasi Struktural Senyawa Organik Bahan Alam. Jurnal Konservasi Cagar Budaya. 2014;8(2):53–61.
 41. Triyanti SB, Lestari FP, Fitriana PAN, Rostiana HR, Silalahi DD, Syalsabina TD, dkk. Pengaruh Metode Ekstraksi Maserasi, Sonikasi, dan Sokletasi Terhadap Nilai Rendemen Sampel Kulit Buah Naga (*Hylocereus polyrhizus*). Jurnal Sains dan Edukasi Sains. 2025;8(1):71–8.
 42. Rismiyati, Oktari S Adinda, Nurrahman A, Rahmayanti MB, Aulia N, Sunarwidhi A. Review: Metode-Metode Ekstraksi. Sci-Tech Journal. 2025;4:17.
 43. Tutik T, Putri GAR, Lisnawati L. Perbandingan Metode Maserasi, Perkolasi Dan Ultrasonik Terhadap Aktivitas Antioksidan Kulit Bawang Merah (*Allium cepa* L.). Jurnal Ilmu Kedokteran dan Kesehatan. 2022;9(3):913–23.
 44. Erwin, Fadliannur, Alimuddin. Ekstraksi dan Isolasi Bahan Alam Secara Klasik dan Modern. Prosiding Seminar Nasional Kimia dan Terapan. 2024;131–4.
 45. Sofyan S, Maesaroh E, Windyaningrum R, Mahardhika BP. The comparison of crude fat analysis between separated soxhlet method and one extractor soxhlet method for several feed ingredients. Jurnal Temapela. 2021;3(2):60–4.
 46. Laksmiani, N. P. L.1, Susanti, N.M.P.1, Widjaja, I. N. K..1, Rismayanti AAMI 1 WIMAG 1. Pengembangan Metode Refluks Untuk Ekstraksi Andrografolid Dari Herba Sambiloto (*Andrographis paniculata* (Burm.f.) Nees). Sainstech Farma. 2017;
 47. Uzwatania F, Ma'ruf A, Jumadi. The Effect of Extraction Temperature and Time on Digestion Method on Red Ginger (*Zingiber officinale* var. rubrum) Activities at PT. X. Jurnal Teknologi Pangan dan Gizi. 2024;23(2):104–12.

48. Tandah MR. Daya Hambat Dekokta Klutit Buah Manggis Terhadap Bakteri *Escherichia coli*. Jurnal Kesehatan tadulako. 2016;2(1):1–75.
49. Rahmawati S, Marliza M, Sari RIP, Wirahmi N, Oktoviani O, Sipriyadi S. Skrining Fitokimia Infusa Daun Sungkai (*Peronema canescens* Jack.) Dengan Metode Reaksi Warna. Journal Pharmacopoeia. 2023;2(2):120–7.
50. Hasanah AN. Assessment of Total Phenolic and Flavonoid Content from Nine Different Families of Herbal Medicines Originated from West Java, Indonesia. Indonesian Journal of Pharmaceutical Science and Technology. 2025;12(1):49–62.
51. Diniyah N, Lee SH. Komposisi Senyawa Fenol Dan Potensi Antioksidan Dari Kacang-Kacangan: Review. Jurnal Agroteknologi. 2020;14(01):91.
52. Zagoskina NV, Zubova MY, Nechaeva TL, Kazantseva VV, Goncharuk EA, Katanskaya VM, dkk. Polyphenols in Plants: Structure, Biosynthesis, Abiotic Stress Regulation, and Practical Applications (Review). International Journal of Molecular Sciences. 2023;24(18).
53. Salim SA, Levita J, Saptarini NM, Saputri FA. Review Artikel: Kelebihan dan Keterbatasan Perekasi Folinciocalteu dalam Penentuan Kadar Fenol Total Pada Tanaman. Farmaka. 2020;18(1):46–57.
54. Khoirunnisa I, Sumiwi SA. Review Artikel: Peran Flavonoid Pada Berbagai Aktifitas Farmakologi. Farmaka. 2019;17(2):131–42.
55. Ahyani IN, Mahbub F, Trifena A, Kanalung P, Kusumaningtyas FA. Penetapan Kadar Flavonoid Total dan Uji Aktivitas Antioksidan Ekstrak Kulit Coklat dengan Metode DPPH dan FRAP. Majalah Farmaseutik. 2025;21(2):213–20.
56. Hidayanti M, Sarah E, Kurniatin PA. Validasi Metode Analisis Total Flavonoid dalam Ekstrak Etanol Sirih Merah (*Piper crocatum* var. Ruiz & Pav) dengan Spektrofotometer Nano BMG Lab. Tech. Jurnal Pengelolaan Laboratorium Pendidikan. 2025;7(2):128–38.
57. Fadlilah AR, Lestari K. Review : Peran Antioksidan Dalam Imunitas Tubuh. Farmaka. 2023;21(2):171–8.
58. Rustaman R, Janitra RS, Azzahra AF, Maulana FA, Rohmatulloh FG, Destiarani W, dkk. Studi Potensi Senyawa Antioksidan dari Kulit Jeruk Nipis

- (*Citrus aurantifolia*) secara in Silico. *Chimica et Natura Acta*. 2023;11(3):136–42.
59. Asrifaturofingah A, Listiowati E, Matsna FU, Putriliana SZ, Ulya NAH. Analisis Aktivitas Senyawa Antioksidan Pada Berbagai Daun Tanaman Herbal dengan Metode DPPH. *Jurnal Pharmascience*. 2024;11(1):98.
60. Putri Novianur Ramadhani, Fathiyatur Rahmah, Nur Luthfia Salim, Silvia Rismawati, Nurul Mas'adah, Rina R, dkk. Review Metode Uji Aktivitas Antioksidan dalam Riset Bahan Alam. *Journal of Literature Review*. 2025;1(2):501–19.
61. Retno Sari. Evaluation of Oral Preparations of Vitamin E as Antioxidant Using DPPH Method (*Diphenyl picrylhydrazyl*). *Berkala Ilmiah Kimia Farmasi*. 2023;10(1):13–7.
62. Theafelicia Z, Narsito Wulan S. Perbandingan Berbagai Metode Pengujian Aktivitas Antioksidan (DPPH, ABTS dan FRAP) Pada Teh Hitam (*Camellia sinensis*). *Jurnal Teknologi Pertanian*. 2023;24(1):35–44.
63. Yang M, Li R, Wang Y, Tan J, Hua S, Zi T, dkk. Rapid Screening Of Antioxidant Bioactive Components In Blue Ginger (*Dichorisandra thyrsiflora*) Essential Oil By GC Electronic-Nose And Radical Scavenging Mechanisms. *Journal of Food Measurement and Characterization*. 2020;14(4):2343–51.
64. Nenadis N, Tsimidou MZ. Oxidation in Foods and Beverages and Antioxidant Applications: Understanding Mechanisms of Oxidation and Antioxidant Activity. Woodhead Publishing Limited. Woodhead Publishing Limited; 2010. 332–367 hlm.
65. Maryam S, Pratama R, Effendi N, Naid T. Analisis Aktivitas Antioksidan Ekstrak Etanolik Daun Yodium (*Jatropha multifida* L.) Dengan Metode Cupric Ion Reducing Antioxidant Capacity (CUPRAC). *Jurnal Fitofarmaka Indonesia*. 2016;2(1):90–3.
66. Syabana MA, Kusumasari S, Salsabila Y, Nurtiana W. Profil FTIR, kandungan fenolik, dan aktivitas penangkapan radikal bebas ekstrak daun talas beneng (*Xanthosoma undipes* K. Koch) dari pelarut dengan polaritas yang berbeda. *Agrointek : Jurnal Teknologi Industri Pertanian*. 2024;18(4):943–54.

67. Faturachman GF, Ramanda AA, Maharani S, Latif LA, Belo GAG, Ayubi SGA. Application of Fourier Transform Infrared Spectroscopy (FTIR) for Quantitative Analysis of Pharmaceutical Compounds. *Indonesian Journal of Pharmaceutical Education*. 2025;5(1):27–33.
68. Fadlemoula A, Pinho D, Carvalho VH, Catarino SO, Minas G. Fourier Transform Infrared (FTIR) Spectroscopy to Analyse Human Blood over the Last 20 Years: A Review towards Lab-on-a-Chip Devices. *Micromachines*. 2022;13(2).
69. Gong Y, Chen X, Wu W. Application of fourier transform infrared (FTIR) spectroscopy in sample preparation: Material characterization and mechanism investigation. *Advances in Sample Preparation*. 2024;11(June):100122.
70. Subamia IDP, Widiasih NN, Sri Wahyuni IGAN, Pratami Kristiyanti PL. Optimasi Kinerja Alat Fourier Transform Infrared (FTIR) Melalui Studi Perbandingan Komposisi dan Ketebalan Sampel-KBr. *Jurnal Pengelolaan Laboratorium Pendidikan*. 2023;5(2):58–69.
71. Saha P, Pandit B, Pramanik S, Shrestha B. a Comprehensive Review on the Applications of Chemometrics in Analytical Chemistry. *Journal of Applied Pharmaceutical Research*. 2025;13(3):1–16.
72. Maulidya V, Hasanah AN, Rijai L, Muchtaridi M. Quality Control and Authentication of Black Betel Leaf Extract (*Piper acre* Blume) from East Kalimantan as an Antimicrobial Agent Using a Combination of High-Performance Liquid Chromatography and Chemometric Fourier Transform Infrared. *Molecules*. 2023;28(15).
73. Islam MA, Ryu KY, Khan N, Song OY, Jeong JY, Son JH, dkk. Determination of the Volatile Compounds in Five Varieties of *Piper betle* L. from Bangladesh Using Simultaneous Distillation Extraction and Gas Chromatography/Mass Spectrometry (SDE-GC/MS). *Analytical Letters*. 2020;53(15):2413–30.
74. Alam MB, Park NH, Song BR, Lee SH. Antioxidant Potential-Rich Betel Leaves (*Piper betle* L.) Exert Depigmenting Action by Triggering Autophagy and Downregulating MITF/Tyrosinase In Vitro and In Vivo. *Antioxidants*. 2023;12(2).

75. Osman MF, Lee SY, Sarbini SR, Faudzi SMM, Khamis S, Zainudin BH, dkk. Metabolomics-driven discovery of an introduced species and two malaysian *Piper betle* l. Variants. *Plants*. 2021;10(11).
76. Veninda HR, Belinda AM, Muhaimin, Febriyanti RM. *Simplicia* Characterization And Phytochemical Screening Of Secondary Metabolite Compounds Of Bebuas Leaves (*Premna serratifolia* L.). *Indonesian Journal of Biological Pharmacy*. 2023;3(2):63–73.
77. Arnida, Maulida, Amalia Khairunisa, Suton F. Standardization of *Simplicia* and Ethanol Extract of Purun Danau (*Lepironia articulata* (Retz.) Domin) Rhizome. *Borneo Journal Of Pharmacy*. 2021;4(4):273–82.
78. Handayani F, Apriliana A, Ariyanti L. Perbandingan Metode Maserasi Dan Refluks Terhadap Rendemen Ekstrak Daun Selutui Puka (*Tabernaemontana macrocarpa* Jack). *Jurnal Farmasi Galenika*. 2019;6(1):33–42.
79. Hikmawanti NPE, Yumita A, Rafiq M, Lusiana L. Phenolics and Flavonoids Content of *Epiphyllum oxypetalum* (DC.) Leaves Fractions using Microplate Based Assay. *Indonesian Journal of Pharmaceutical Science and Technology*. 2023;10(1):45–51.
80. Khatua S, Ghosh S, Acharya K. Simplified methods for microtiter based analysis of in vitro antioxidant activity. *Asian Journal of Pharmaceutics*. 2017;11(2):S327–35.
81. Sholehah K, Kurniasih I, Arifah MF, Setiyawati EA. Effect of Particle Size and Extraction Time on Total Flavonoid Level of *Artemisia vulgaris* Ethanol Extract. *Journal of Biotechnology and Natural Science*. 2024;4(2):70–8.
82. Eka NI, Jayani HOH. Standarisasi *Simplicia* Daun Tempuyung (*Sonchi folium*) Hasil Budidaya Di Ubaya Training Center Trawas Mojokerto. *Journal Of Pharmacy Science And Technology*. 2018;1(1):68–79.
83. Chauhan PR, Wasiullah PM, Yadav P. A review on Evaluation in research of herbal medicine. *Internatioal Journal of Pharmaceuticaal Research and Applications*. 2023;8(3):1021–5.
84. Sari SR, Elya B, Sari SR. Determination of Specific and Non-Specific Parameters of *Simplicia* and Ethanolic 70% Extract of Gadung Tubers (*Dioscorea hispida*). *Pharmacog J*. 2019;11(4):759–63.

85. Nguyen LTT, Nguyen TT, Nguyen HN, Quynh Thi Phuong Bui. Simultaneous determination of active compounds in *Piper betle* Linn. leaf extract and effect of extracting solvents on bioactivity. *Engineering Reports*. 2020;2:e12246.
86. USE ICFHOTRFPFH. IMPURITIES: GUIDELINE FOR RESIDUAL SOLVENTS Q3C(R8) Current. ICH; 2021.
87. Arif Z, Zalukhu A, Karomah AH, Rafi M. Antioxidant Capacity, Total Phenolic, and Flavonoid Content from Java Tea (*Orthosiphon aristatus*) Extracts. *J Jamu Indo*. 30 Desember 2022;7(3):93–101.
88. Andishmand H, Masoumi B, Torbati M, Azadmard- AHRS, Hamishehkar DH. Ultrasonication / dynamic maceration-assisted extraction method as a novel combined approach for recovery of phenolic compounds from pomegranate peel. *Food Science & Nutrition*. 2023;11:7160–71.
89. Zhou W, Li J, Wang X, Liu L, Li Y, Song R, dkk. Research Progress on Extraction, Separation, and Purification Methods of Plant Essential Oils. *Separations*. 7 Desember 2023;10(12):596.
90. Bourgou S, Bettaieb Rebey I, Ben Kaab S, Hammami M, Dakhlaoui S, Sawsen S, dkk. Green Solvent to Substitute Hexane for Bioactive Lipids Extraction from Black Cumin and Basil Seeds. *Foods*. 28 Juni 2021;10(7):1493.
91. Yasir B, Mus S, Rahimah S, Tandiongan RM, Klara KP, Afrida N, dkk. Antimicrobial Profiling of *Piper betle* L. and *Piper nigrum* L. Against Methicillin-Resistant *Staphylococcus aureus* (MRSA): Integrative Analysis of Bioactive Compounds Based on FT-IR, GC-MS, and Molecular Docking Studies. *Separations*. 8 November 2024;11(11):322.
92. Mega Efrilia, Evan YEC, Pra Panca Bayu Chandra, Ema Hermawati. Eksplorasi Kandungan Fenolik Total Buah Okra (*Abelmoschus esculentus* L.) Sebagai Kandidat Produk Herbal. *Jurnal Ilmiah Manuntung: Sains Farmasi Dan Kesehatan*. 28 Mei 2025;11(1):65–72.
93. Furi M, Al Basit N, Ikhtiarudin I, Utami R. Penentuan total fenolik, flavonoid dan uji aktivitas antioksidan ekstrak dan fraksi daun kedabu (*Sonneratia ovata* Backer). *JFI*. 2020;12(1):48–59.
94. Mohammed EA, Abdalla IG, Alfawaz MA, Mohammed MA, Al Maiman SA, Osman MA, dkk. Effects of extraction solvents on the total phenolic content,

total flavonoid content, and antioxidant activity in the aerial part of root vegetables. *Agriculture*. 2022;12(11):1820.

95. Vikrama Chakravarthi P, Murugesan S, Arivuchelvan A, Sukumar K, Arulmozhi A, Jagadeeswaran A. GC-MS profiling of methanolic extract of *Piper betle* (Karpoori Variety) leaf. *J Pharmacogn Phytochem*. 2018;7:2449–52.
96. Lee J eun, Thilini J, Jayakody M, Kim J il, Jeong J woo, Choi K min, dkk. The Influence of Solvent Choice on the Extraction of Bioactive Compounds from Asteraceae : A Comparative Review. *Foods*. 2024;13:1–21.
97. Ibrahim TA, Hassen A, Apostolidis Z. The Antimethanogenic Potentials of Plant Extracts: Their Yields and Phytochemical Compositions as Affected by Extractive Solvents. *Plants*. 29 November 2022;11(23):3296.
98. Chaves JO, De Souza MC, Da Silva LC, Lachos-Perez D, Torres-Mayanga PC, Machado APDF, dkk. Extraction of Flavonoids From Natural Sources Using Modern Techniques. *Front Chem*. 25 September 2020;8:507887.
99. Yuniarto A, Junaidin, Setiawan AA, Juanda D, Ardiansyah A, Saraswaty V. Analysis of antioxidant properties of pomegranate (*Punica granatum* L.) Peel extract: Voltammetric, spectrophotometric, and in silico studies as a potential antidiabetic candidate. *Talanta Open*. Desember 2025;12:100569.
100. Anwar K, Lokana FM, Budiarti A. Antioxidant Activity of Dewandaru Leaf (*Eugenia uniflora* L.) Ethanol Extract and Determination of Total Flavonoid and Phenolic Content. *Jurnal Ilmiah Sains*. 2022;161–71.
101. Hidayah H, Amal S, Dahlia I. Aktivitas Kandungan Daun Sirih (*Piper betle* L.) Sebagai Antioksidan: Literature Review Article. *Jurnal Buana Farma*. 2022;2(3):47–51.
102. Poudel M, Koirala N, Mehta RK, Lamsal A. Estimation of Phytochemical Constituents and Evaluation of Antioxidant Potency of *Piper betle* Leaves. *Nepal J Biotechnol*. 31 Juli 2024;12(1):48–57.
103. Isnindar, Luliana S, Zahid M. Effect of Extraction, Ratio, and Solvent Concentration on Total Flavonoid Content and Antioxidant Activity of Singkel (*Premna serratifolia* Linn.) Using DPPH Method. *Jurnal Teknosains*. 2025;14(2).

104. Nordin MAF, Wan Harun WHA, Abdul Razak F, Musa MY. Growth inhibitory response and ultrastructural modification of oral-associated candidal reference strains (ATCC) by *Piper betle* L. extract. Int J Oral Sci. Maret 2014;6(1):15–21.
105. Lister INE, Ginting CN, Girsang E, Armansyah A, Marpaung HH, Sinaga APF, dkk. Antioxidant properties of red betel (*Piper crocatum*) leaf extract and its compounds. Journal of Natural Remedies. 2019;19(4):198–205.

