

DAFTAR PUSTAKA

- Abdelrahim, M. S., Baky, A. M. A., Bayoumi, S. A. L., Mohamed, S. M., Abdel- Mageed, W. M., & Backheet, E. Y. (2023). Cytotoxic flavone - C- glycosides from the leaves of *Dypsis pambana* (H .E .Moore) Beentje & J.Dransf .,Arecaceae: in vitro and molecular docking studies. *BMC Complementary Medicine and Therapies*, 23(214), 1–9. <https://doi.org/10.1186/s12906-023-04046-0>
- Abdullah, S. S., Putra, P. P., Antasionasti, I., Suoth, E. J., Putri, R., & Abdullah, I. (2021). Analisis Sifat Fisikokimia, Farmakokinetik Dan Toksikologi Pada *Pericarpium Pala* (*Myristica fragrans*) Secara Artificial Intelligence. *Chem. Prog.*, 14(2), 81–92. <https://doi.org/https://doi.org/10.35799/cp.14.2.2021.37112>
- Abotaleb, M., Samuel, S. M., Varghese, E., Varghese, S., Kubatka, P., Liskova, A., & Büsselberg, D. (2019). Flavonoids in Cancer and Apoptosis. *Cancers*, 11(28), 1–39. <https://doi.org/10.3390/cancers11010028>
- Adelya, L., Dewi, P. C., Auw, Z. C., Winengku, R. T. P., Mase, Setyaningsih, D., & Riswanto, F. D. O. (2022). Potensi Herba Bandotan (*Ageratum conyzoides* L.) sebagai Agen Antikanker Payudara. *Cendekia Journal of Pharmacy*, 6(1), 1–12. <https://doi.org/https://doi.org/10.31596/cjp.v6i1.153>
- Afifah, K., Aulia, L. N., Fitri, R., & Purnama, E. R. (2024). Molecular Docking Senyawa Heparan Sulfate dan Hyaluronic acid Lendir Bekicot (*Lissachatina fulica*) terhadap Reseptor TGF- β Pada Proses Penyembuhan Luka. *BIOTROPIC The Journal of Tropical Biology*, 8(2), 1–10. <https://doi.org/https://doi.org/10.29080/biotropic.v8i2.2077>
- Ahmed, Q. U., Alhassan, A. M., Khatib, A., Adnan, S., Shah, A., Hasan, M. M., & Sarian, M. N. (2018). Antiradical and Xanthine Oxidase Inhibitory Activity Evaluations of *Averrhoa bilimbi* L . Leaves and Tentative Identification of Bioactive Constituents through LC-QTOF-MS / MS and Molecular Docking Approach. *Antioxidants*, 7(137), 1–16. <https://doi.org/10.3390/antiox7100137>
- Akbar, N. A., Amin, S., & Wulandari, W. T. (2022). Studi In Silico Senyawa yang Terkandung dalam Tanaman Daun Sirih Merah (*Piper crocatum* RUIZ & PAV) sebagai Kandidat Anti SARS CoV-2. *Prosiding Seminar Nasional Diseminasi Hasil Penelitian Program Studi S1 Farmasi*, 2(1), 378–391.
- Alfira, E. N., Nurhidayati, L. G., Diana, I. M., Krisdiantho, R. K., & Rofiqi, A. A. (2025). Metabolite Profiling of *Averrhoa bilimbi* L. Fruit and Leaf Extracts Using Ultra High Performance Liquid Chromatography-High Resolution and Multistage Mass Spectrometry. *Indones. J. Chem*, 1–10. <https://doi.org/10.22146/ijc.100297>
- Ali, H., Nurmayanti, D., Rasyid, N. Q., Elsa, L., Prianti, I. A., Aprianie, W.,

- Mahdang, P. A., Kandari, A. M., Khambali, Rachmamiyah, Ula, M., & Muawanah. (2024). *Toksikologi Lingkungan dan Industri* (N. Pujirahayu & R. Tosepu (eds.); 1st ed.). EUREKA MEDIA AKSARA.
- Amelia, S., Sunarti, & Febrina, D. (2024). Kadar Ureum Dan Kreatinin Tikus Pada Studi Toksisitas Akut Ekstrak Etanol Bunga Telang (*Clitoria Ternatea* L.). *Pharmacy Genius*, 03(01), 18–26. <https://doi.org/https://doi.org/10.56359/pharmgen.v3i01.318>
- Amin, S., Fauzan, M., Zidane, M., & Fathurrochman, M. (2024). Studi Komputasi Potensi Anti-Kanker Payudara dari Senyawa Bioaktif Daun Belimbing Wuluh. *Prosiding Seminar Nasional Diseminasi Penelitian Program Studi S1 Farmasi*, 4, 317–331.
- Amin, S., & Nabila, L. S. (2025). Review Artikel : Peran Pendekatan In Silico dalam Kimia Medisinal Untuk Perancangan Senyawa Antibiotik Baru. *Indonesian Journal of Science*, 1(6), 1345–1349. <https://doi.org/https://doi.org/10.31004/science.v1i6.252>
- Amin, S., Wihdatunnisa, I., Aisyah, R., & Kurniawan, Y. S. (2024). Potensi Senyawa Kuersetin sebagai Antikanker Payudara melalui Pendekatan Molecular Docking. *Jurnal Ilmu Medis Indonesia*, 4(1), 41–51. <https://doi.org/https://doi.org/10.35912/jimi.v4i1.4565>
- Arifin, R. N. A. R., & Jumal, J. (2021). Antioxidant Activity of *Averrhoa bilimbi* Linn. Leaves Extract Using Two Different Types of Solvents. *Malaysian Journal of Science Health & Technology*, 7(Special), 76–82. <https://doi.org/10.33102/mjosht.v7i.112>
- Atiyah, M., Jasim, S., & Atiyah, M. (2022). Phytochemical Screening and Antibacterial Activities of Aqueous and Alcoholic Extracts of *Averrhoa bilimbi* Leaf against Bacteria Isolated from Oral Cavity. *Archives of Razi Institute*, 77(2), 923–928. <https://doi.org/10.22092/ARI.2022.357207.1996>
- Azizah, Z., Rivai, H., Chandra, B., Misfadhila, S., & Ferdian, S. (2022). Analisis Fitokimia Dari Ramuan Obat Tradisional Untuk Penurun Panas Sambiloto (*Andrographis paniculata* (Burm.F.) Nees). *Jurnal Farmasi Higea*, 13(2), 137. <https://doi.org/10.52689/higea.v13i2.398>
- Bafna, D., Ban, F., Rennie, P. S., Singh, K., & Cherkasov, A. (2020). Computer-Aided Ligand Discovery for Estrogen Receptor Alpha. *International Journal of Molecular Sciences*, 21, 1–60. <https://doi.org/doi:10.3390/ijms21124193>
- Bandbe, T., Kumari, U., & Brahma, D. (2024). Structure-Based Drug Design and Molecular Target Prediction of Transthyretin Variant A97S Complexed. *Journal of Emerging Technologies and Innovative Research (JJETIR)*, 11(9), 316–326.
- Banerjee, P., Eckert, A. O., Schrey, A. K., & Preissner, R. (2018). ProTox-II : a Webserver for the Prediction of Toxicity of Chemicals. *Nucleic Acids*

- Research*, 46(April), 257–263. <https://doi.org/10.1093/nar/gky318>
- Belgica, T. H. R., Suba, M. D., & Alejandro, G. J. D. (2021). Quantitative ethnobotanical study of medicinal flora used by local inhabitants in selected Barangay of Malinao, Albay, Philippines. *BIODIVERSITAS*, 22(7), 2711–2721. <https://doi.org/10.13057/biodiv/d220720>
- Benedictin, M., Cahyani, S., Khairul, A., Purba, R., Wihandono, A., & Purwaningsih, S. (2024). Relationship Between Comorbidity and Mortality of Stage IV Breast Cancer : A Literature Review. *Magna Scientia Advanced Research and Reviews*, 11(02), 385–395. <https://doi.org/10.354/msarr>
- Bidooki, S. H., Quero, J., Javier, S., Herrero-continente, T., Lasheras, R., Sebastian, V., Arruebo, M., Osada, J., & Rodriguez-Yoldi, M. J. (2024). Squalene in Nanoparticles Improves Antiproliferative Effect on Human Colon Carcinoma Cells Through Apoptosis by Disturbances in Redox Balance. *International Journal of Molecular Sciences*, 25, 1–17. <https://doi.org/https://doi.org/10.3390/ijms252313048>
- Braicu, C., Pilecki, V., Balacescu, O., Irimie, A., & Neagoe, I. B. (2011). The Relationships Between Biological Activities and Structure of Flavan-3-Ols. *International Journal of Molecular Sciences*, 12, 9342–9353. <https://doi.org/10.3390/ijms12129342>
- Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 74(3), 229–263. <https://doi.org/10.3322/caac.21834>
- Clusan, L., Ferrière, F., Flouriot, G., & Pakdel, F. (2023). A Basic Review on Estrogen Receptor Signaling Pathways in Breast Cancer. *International Journal of Molecular Sciences*, 24, 1–19. <https://doi.org/https://doi.org/10.3390/ijms24076834>
- Fatmawati, I., Haeruddin, & Mulyana, W. O. (2023). Uji Aktivitas Antioksidan Ekstrak Etil Asetat Daun Belimbing Wuluh (*Aveerrhoa bilimbi* L.) dengan Metode DPPH. *SAINS: Jurnal Kimia Dan Pendidikan Kimia*, 12(1), 41–49.
- Fauzi, F., Faiz, M., & Zulkarnain, M. (2024). Heliyon Phytol and Bilimbi Phytocompounds Induce Thermogenic Adipocyte Differentiation : An In Vitro Study on Potential Anti-Obesity Effects. *Heliyon*, 10(23), e40518. <https://doi.org/10.1016/j.heliyon.2024.e40518>
- Febrianti, R. H., & Ratnasari, F. (2022). Faktor-Faktor yang Berhubungan dengan Kepatuhan Penderita Kanker Payudara dalam Menjalani Terapi Hormonal di Rumah Sakit Kanker Dharmas Jakarta. *Cerdika: Jurnal Ilmiah Indonesia*, 2(9), 811–820. <https://doi.org/10.36418/cerdika.v2i9.432>
- Fernandes, J., Prabhu, R., Sudhina, M., & Fernandes, R. (2023). Hepatoprotective

- Activity of Averrhoa bilimbi Leaf Extract Against Alcohol-Induced Liver Damage in Wistar Rats. *Research Journal of Pharmacy and Technology*, 16(4), 1727–1730. <https://doi.org/10.52711/0974-360X.2023.00284>
- Frimayanti, N., Dona, R., & Cahyana, F. (2020). Simulasi Molecular Dynamic (MD) Senyawa Analog Kalkon Sebagai Inhibitor Untuk Sel Kanker Paru A549. *Jurnal Penelitian Farmasi Indonesia*, 9(2), 56–60.
- Garg, M., Chaudhary, S. K., Kumari, S., & Goyal, A. (2022). Phytochemical , Biological and Traditional Claims on Averrhoa bilimbi : An Overview. *Indian Journal of Pharmaceutical Sciences*, 84(3), 532–542. <https://doi.org/10.36468/pharmaceutical-sciences.947>
- Guo, Y., Tong, J., Liang, J., Shi, K., Song, X., Guo, Z., Liu, B., & Xu, J. (2024). Molecular insight into binding affinities and blockade effects of selected flavonoid compounds on the PD-1/PD-L1 pathway. *Royal Society of Chemistry*, 14, 25908–25917. <https://doi.org/10.1039/d4ra03877k>
- Hakiki, A., Andika, & Rahmawati. (2024). Studi Molecular Docking dan Prediksi ADMET Senyawa Turunan Kurkumin Sebagai Inhibitor Kasein Kinase 2- α . *LUMBUNG FARMASI; Jurnal Ilmu Kefarmasian*, 5(2), 1995–212.
- Hamzah, M. F., Amanah, A., & Lau, W. K. (2021). Isolation of Active Averrhoa bilimbi Phytocompounds Corresponding to Brown Adipocytes Stimulation [Version 1; Peer Review: 2 Approved with Reservations]. *F1000Research*, 10(398), 1–24. <https://doi.org/https://doi.org/10.12688/f1000research.52197.1>
- Hapsari, I. (2022). Program Sosialisasi Pemanfaatan dan Pengelolaan Buah Belimbing Wuluh. *SABANGKA ABDIMAS (Jurnal Pengabdian Masyarakat Sabangka)*, 01(05), 158–166. <https://doi.org/https://doi.org/10.62668/sabangka.v1i05.285>
- Hardiana, H., Fauziah, Adriani, A., & Rahman, F. (2021). Gambaran Penggunaan Tumbuhan Obat Pada Masyarakat Desa Alue Kecamatan Pidie Kabupaten Pidie. *Jurnal Sains Dan Kesehatan Darussalam*, 1(2), 29–37. <https://doi.org/10.56690/jskd.v1i2.14>
- Hardianti, B., Anwar, I., Sida, N. A., Sumiati, E., Rita, R. S., Amin, A., Suherman, Jati, M. A. S., Nasruddin, N. I., Larasati, M. D., Salman, & Dewi, Y. R. (2023). *Biokimia Advance* (Subehan & Tien (eds.); 1st ed.). EUREKA MEDIA AKSARA.
- Hasan, R., I'nanah, F. C., & Bahi, R. R. R. (2022). Docking Molekuler Senyawa Potensial Daun Kelor (Moringa oleifera) Terhadap Reseptor Folat. *Journal of Innovation Research and Knowledge*, 2(2), 519–526. <https://doi.org/https://doi.org/10.53625/jirk.v2i2.2918>
- Hasanah, N., & Novian, D. R. (2020). Daya Hambat Ekstrak Daun Belimbing Wuluh (Averrhoa bilimbi L) Terhadap Bakteri Penyebab Jerawat

- (*Propionibacterium acnes*). *Parapemikir : Jurnal Ilmiah Farmasi*, 9(1), 46. <https://doi.org/10.30591/pjif.v9i1.1753>
- Hasim, H., Arifin, Y. Y., Andrianto, D., & Faridah, D. N. (2019). Ekstrak Etanol Daun Belimbing Wuluh (*Averrhoa bilimbi*) sebagai Antioksidan dan Antiinflamasi. *Jurnal Aplikasi Teknologi Pangan*, 8(3), 86. <https://doi.org/10.17728/jatp.4201>
- Herlina, T., Wahid, A., Akili, R., Nishinarizki, V., Hardianto, A., Sulaeman, A. P., Gaffar, S., Julaeha, E., Mayanti, T., Supratman, U., Nafiah, M. A., & Latip, J. B. (2024). Cytotoxic Evaluation , Molecular Docking , Molecular Dynamics , and ADMET Prediction of Isolupalbigenin Isolated from *Erythrina subumbrans* (Hassk). Merr. (Fabaceae) Stem Bark : Unveiling Its Anticancer Efficacy. *OncoTargets and Therapy*, 17, 829–840. <https://doi.org/https://doi.org/10.2147/OTT.S482469>
- Hero, S. K. (2021). Faktor Resiko Pada Kanker Payudara. *Jurnal Medika Hutama*, 03(01), 3–8.
- Holeček, M. (2024). Origin and Roles of Alanine and Glutamine in Gluconeogenesis in the Liver, Kidneys, and Small Intestine under Physiological and Pathological Conditions. *International Journal of Molecular Sciences*.
- Hrp, N. A., Masruro, Z., Saragih, S. Z., Hasibuan, R., Simamora, S. S., & Toni. (2022). *Buku Ajar Belajar dan Pembelajaran* (N. Rismawati (ed.); 1st ed.). Widina Bhakti Persada Bandung.
- Hua, H., Zhang, H., Kong, Q., & Jiang, Y. (2018). Mechanisms for Estrogen Receptor Expression in Human Cancer. *Experimental Hematology & Oncology*, 7(24), 1–11. <https://doi.org/10.1186/s40164-018-0116-7>
- Hublikar, L. V., Ganachari, S. V., & Patil, V. B. (2023). Phytofabrication of Silver Nanoparticles Using *Averrhoa bilimbi* Leaf Extract for Anticancer Activity. *Nanoscale Advances*, 5(16), 4149–4157. <https://doi.org/10.1039/d3na00313b>
- Husni, S., Malawat, M., Piskariannisa, W., Aulia, N., Khalisa, N., Pratama, R. R., Fauzi, M., Andryanto, M. H., & Fadillah, A. (2026). Studi Penambatan Molekuler In Silico Senyawa Bioaktif Zingiber officinale Terhadap Reseptor 3ERT pada Kanker Payudara. *Jurnal Mahasiswa Ilmu Kesehatan*, 4(1), 163–181. <https://doi.org/https://10.59841/jumkes.v4i1.3577>
- Indratmoko, S., Nurani, L. H., & Wahyuningsih, I. (2022). Penmbatan Molekuler Fosfodiesterase Tipe 5 Oleh Senyawa Aktif Icariin Sebagai Terapi Disfungsi Ereksi. *Seminar Nasional Dan Prosiding S1 Farmasi Dan D3 Farmasi. Univ. Al Irsyad Cilacap*, 292–298.
- International Agency for Research on Cancer. (2022). *Global Cancer Observatory* (IARC (ed.)). World Health Organization; International Agency for Research

on Cancer (IARC).

- Iqmy, L. O., Setiawati, & Yanti, D. E. (2021). Faktor Risiko yang Berhubungan dengan Kanker Payudara. *Jurnal Kebidanan*, 7(1), 32–36. <https://doi.org/10.33024/jkm.v7i1.3581>
- Ismail, D. P. F., Christella, A., Salsabila, N. F., Angelina, A., Muljono, F. O., Fardhan, F. M., & Novitasari, D. (2025). The Bioactive compounds in Bilimbi Leaves (*Averrhoa bilimbi* L.) as Natural-Based Anticancer Targeting on VEGFR-2: In Silico Studies. *Notulae Scientia Biologicae*, 13(1), 1–22. <https://doi.org/10.15835/nsb17112289>
- Iwansyah, A. C., Desnilasari, D., Agustina, W., Pramesti, D., Indriati, A., Mayasti, N. K. I., Andriana, Y., & Kormin, F. B. (2021). Evaluation on The Physicochemical Properties and Mineral Contents of Averrhoa bilimbi L. Leaves Dried Extract and its Antioxidant and Antibacterial Capacities. *Food Science and Technology (Brazil)*, 41(4), 987–992. <https://doi.org/10.1590/fst.15420>
- Jan, R., Asaf, S., Numan, M., Lubna, & Kim, K. M. (2021). Plant Secondary Metabolite Biosynthesis and Transcriptional Regulation in Response to Biotic and Abiotic Stress Conditions. *Agronomy*, 11(5), 1–31. <https://doi.org/10.3390/agronomy11050968>
- Jasmine, F. K., Aryani, R., Cahya, G., & Darma, E. (2025). Formulasi Hard Candy Lozenges Ekstrak Daun Belimbing Wuluh dengan Madu Trigona. *Bandung Conference Series: Pharmacy*, 5(2), 1–10. <https://doi.org/https://doi.org/10.29313/bcsp.v5i2.20781>
- Kalli, S., Semine, A., Cohen, S., Naber, S. P., Makim, S. S., & Bahl, M. (2018). American Joint Committee on Can-cer ' s Staging System for Breast Cancer , Eighth Edition: What the Radiologist Needs to Know. *RadioGraphics*, 38, 1921–1933. <https://doi.org/https://doi.org/10.1148/rg.2018180056>
- Kaniawati, E., Mardani, M. E., Lestari, S. N., Nurmilah, U., & Setiawan, U. (2023). Evaluasi Media Pembelajaran. *Journal of Student Research (JSR)*, 1(2), 18–32. <https://doi.org/https://doi.org/10.55606/jsr.v1i2.954>
- Karo-karo, R. S., Iskandar, & Nazaruddin. (2024). Pengeringan Belimbing Wuluh (*Averrhoa Bilimbi* L) Menggunakan Tipe Lorong Berbasis Arduino Mega 2560. *Jurnal Ilmiah JURUTERA*, 11(01), 048–057. <https://doi.org/https://10.55377/jurutera.v11i01.9298>
- Kemenkes RI. (2022). *Kanker Payudara Paling Banyak di Indonesia, Kemenkes Targetkan Pemerataan Layanan Kesehatan*. Kementerian Kesehatan Republik Indonesia.
- Kementerian Kesehatan Republik Indonesia. (2025). *Seminar Nasional Dalam Rangka World Cancer Day Tema Harapan Dan Upaya Bebas Kanker Payudara Bagi Wanita*.

- Ketut, S., & Kartika, S. L. M. K. (2022). Kanker Payudara: Diagnostik, Faktor Risiko, dan Stadium. *Ganesha Medicina Journal*, 2(1), 42–48.
- Khairani, S., Keban, S. A., & Afrianty, M. (2019). Evaluasi Efek Samping Obat Kemoterapi terhadap Quality of Life (QoL) Pasien Kanker Payudara di Rumah Sakit X Jakarta. *Jurnal Ilmu Kefarmasian Indonesia*, 17(1), 9–13.
- Khan, A., Junaid, M., Li, C., Saleem, S., Humayun, F., Shamas, S., Ali, S. S., Babar, Z., & Wei, D.-Q. (2020). Dynamics Insights Into the Gain of Flexibility by Helix-12 in ESR1 as a Mechanism of Resistance to Drugs in Breast Cancer Cell Lines. *Frontiers in Molecular Biosciences*, 6(January), 1–14. <https://doi.org/10.3389/fmolb.2019.00159>
- Kwok, C., & Nolan, M. (2023). Cardiotoxicity of Anti-cancer Drugs: Cellular Mechanisms and Clinical Implications. *Frontiers in Cardiovascular Medicine*, September, 1–14. <https://doi.org/10.3389/fcvm.2023.1150569>
- Lee, S., & Barron, M. G. (2017). Structure-Based Understanding of Binding Affinity and Mode of Estrogen Receptor α Agonists and Antagonists. *PLoS ONE*, 12(1), 1–14. <https://doi.org/10.1016/j.tiv.2007.08.004>
- Leliqia, N. P. E., & Safitri, I. (2021). A Review of Phytochemical Properties, Antibacterial Activity, and Toxicity Study of Averrhoa bilimbi Leaves and Fruit. *Journal of Pharmaceutical Science and Application*, 3(1), 32. <https://doi.org/10.24843/jpsa.2021.v03.i01.p04>
- Li, J., Lin, Y., He, L., Ou, R., Chen, T., Zhang, X., Li, Q., Zeng, Z., & Long, Q. (2021). Two New Isoprenoid Flavonoids from Sophora flavescens with Antioxidant and Cytotoxic Activities. *Molecules*, 26(23), 1–12. <https://doi.org/10.3390/molecules26237228>
- Liu, Z., Shi, W., Hong, G., Chen, W., Song, B., & Peng, X. (2019). A Dual-Targeted Theranostic Photosensitizer Based on a TADF Fluorescein Derivative. *Journal of Controlled Release*, 310(May), 1–10. <https://doi.org/10.1016/j.jconrel.2019.08.001>
- Liyaqat, T., Ahmad, T., Kashif, M., & Saxena, C. (2024). Stacked Ensemble-Based Mutagenicity Prediction Model Using Multiple Modalities with Graph Attention Network. *Medical & Biological Engineering & Computing*, 63, 1–29.
- Masand, V. H., Al-hussain, S. A., Alzahrani, A. Y., Al-mutairi, A. A., Hussien, R. A., Samad, A., & Zaki, M. E. A. (2024). Estrogen Receptor Alpha Binders for Hormone-Dependent Forms of Breast Cancer: e - QSAR and Molecular Docking Supported by X- ray Resolved Structures. *ACS Omega*, 9, 16759–16774. <https://doi.org/10.1021/acsomega.4c00906>
- Maximov, P. Y., Abderrahman, B., Hawsawi, Y. M., Chen, Y., Foulds, C. E., Jain, A., Malovannaya, A., Fan, P., Curpan, R. F., Han, R., Fanning, S. W., Broom, B. M., Rincon, D. M. Q., Greene, G. L., & Jordan, V. C. (2020). The

- Structure-Function Relationship of Angular Estrogens and Estrogen Receptor Alpha to Initiate Estrogen-Induced Apoptosis in Breast Cancer Cellss. *Molecular Pharmacology*, 2015(98), 24–37. <https://doi.org/10.1124/mol.120.119776>
- Mohtar, K., Fatimawali, Rumondor, E. M., Datu, O. S., & Tallei, T. (2021). Studi In Silico Senyawa Eugenol Cengkeh (*Syzygium aromaticum* L.) terhadap Reseptor ER- α , ER- β dan HER-2 pada Kanker Payudara. *PHARMACON*, 10(3), 1001–1008.
- Momenimovahed, Z., & Salehiniya, H. (2019). Epidemiological Characteristics Of And Risk Factors for Breast Cancer In The World. *Breast Cancer: Targets and Therapy*, 151–14. <https://doi.org/10.2147/BCTT.S176070>
- Muhdiah, M., Lestari, S., Safitri, L., Cahyani, C., Febriani, A., Andini, A., Berlian, B., Aji Ramansyah, J., Johani, J., Khairul Wafa, M., & Hasuna, K. (2024). Pelatihan Ibu PKK pada Pembuatan Sediaan Serbuk Herbal Jahe (*Zingir officinale*) dan Kunyit (*Curcuma longa*) sebagai Peningkat Imunitas Tubuh dan Pencegahan Stunting di Desa Janggi Kecamatan Karau Kuala. *Jurnal Pengabdian Kepada Masyarakat Nusantara*, 5(1), 916–921. <https://doi.org/10.55338/jpkmn.v5i1.2834>
- Mulia, S., & Sunarmi. (2024). Evaluasi Mutu Simplisia Rimpang Temulawak (*Curcuma xanthorrhiza* Roxb .) di Pasar Besar Klaten. *In Prosiding Polkesta Seminar Nasional*, 1, 344–352.
- Mustiqawati, E., & Supardi, S. (2022). Uji Aktivitas Antioksidan Ekstrak Metanol Daun Belimbing Wuluh (*Averrhoa bilimbi*). *Jurnal Sains Dan Kesehatan*, 1(1), 11–15. <https://doi.org/10.57151/jsika.v1i1.1>
- Nabillah, A., & Chatri, M. (2024). Peranan Senyawa Metabolit Sekunder Untuk Pengendalian Penyakit Pada Tanaman. *Jurnal Pendidikan Tambusai*, 8(1), 15900–15911. <https://doi.org/10.31004/jptam.v8i1.14640>
- Nadhifah, A. L., & Mulia, M. (2025). Uji Kualitatif Fitokimia Ekstrak Daun Alpukat (*Persea americana* Mill.) dan Daun Belimbing Wuluh (*Averrhoa bilimbi* L.) serta Kombinasinya. *MASALIQ: Jurnal Pendidikan Dan Sains*, 5(5), 2487–2496. <https://doi.org/10.58578/masaliq.v5i5.7301>
- Nair, M. S., Soren, K., Singh, V., & Boro, B. (2016). Anticancer Activity of Fruit and Leaf Extracts of *Averrhoa Bilimbi* on MCF-7 Human Breast Cancer Cell Lines: A Preliminary Study. *Austin Journal of Pharmacology and Therapeutics*, 4(2), 1–5.
- Naufa, F., Mutiah, R., Yen, Y., & Indrawijaya, A. (2022). Studi in Silico Potensi Senyawa Katekin Teh Hijau (*Camellia sinensis*) sebagai Antivirus SARS CoV-2 terhadap Spike Glycoprotein (6LZG) dan Main Protease (5R7Y). *Journal of Food and Pharmaceutical Sciences*, 10(1), 584–596. <https://doi.org/10.22146/jfps.3580>

- Nazarova, A. L., & Katritch, V. (2022). It all clicks together : In silico drug discovery becoming mainstream. *Clinical and Translational Medicine*, 12, 3–5. <https://doi.org/10.1002/ctm2.766>
- Norouzi, S., Nahmiach, N., Perez, G., Zhu, Y., Peslherbe, G. H., Muir, D. C. G., & Zhang, X. (2025). Molecular docking for screening chemicals of environmental health concern: insight from a case study on bisphenols. *Royal Society of Chemistry*, 27, 3192–3207. <https://doi.org/10.1039/d5em00084j>
- Novianti, P., & Syamsurizal, S. (2021). Booklet sebagai Suplemen Bahan Ajar pada Materi Kingdom Animalia untuk Peserta Didik Kelas X SMA / MA. *Jurnal Edutech Undiksha*, 9(2), 225–230. <https://doi.org/https://doi.org/10.23887/jeu.v9i2.40438>
- Nugraha, G., Suprayetno, & Pangestu, D. R. (2022). Validasi Internal Kompleks Reseptor HMG-COA Reduktase (Pdb:1HWK)-Atorvastatin sebagai Antikolesterol dengan Metode Penambatan Ulang. *Babul Ilmi_Jurnal Ilmiah Multi Science Kesehatan*, 14(2), 172–183. <https://doi.org/https://doi.org/10.36729/bi.v14i2.963>
- Nurrohmah, A., Aprianti, A., & Hartutik, S. (2022). Risk Factors of Breast Cancer. *GASTER Journal of Health Science*, 20(1), 1–10. <https://doi.org/https://doi.org/10.30787/gaster.v20i1.777>
- Ozkan, G., Kostka, T., Esatbeyoglu, T., & Capanoglu, E. (2020). Effects of Lipid-Based Encapsulation on the Bioaccessibility and Bioavailability of Phenolic Compounds. *Molecules*, 25(23), 1–23. <https://doi.org/https://doi.org/10.3390/molecules25235545>
- Pan, J., Liang, H., Zhou, L., Lu, W., Huo, B., Liu, R., & Huang, P. (2024). SQLE-Mediated Squalene Metabolism Promotes Tumor Immune Evasion in Pancreatic Cancer. *Frontiers In Immunology*, 15, 1–13. <https://doi.org/10.3389/fimmu.2024.1512981>
- Parasian, J., Susilowati, Y., Septimar, Z. M., & Haeriyah, S. (2024). Hubungan Efek Samping Kemoterapi dengan Kualitas Hidup Pasien Kanker Payudara di Rumah Sakit Kanker Dharmais Provinsi DKI Jakarta Tahun 2023. *Termometer: Jurnal Ilmiah Ilmu Kesehatan Dan Kedokteran*, 2(1), 115–126. <https://doi.org/https://doi.org/10.55606/termometer.v2i1.2808>
- Pardede, A., Ariessanty, R. R., & Wardhani, A. K. (2025). Analisis Senyawa Metabolit Sekunder Dari Batang, Daun Dan Akar Tumbuhan Kelakai (Stenochlaena palustris). *Dalton: Jurnal Pendidikan Kimia Dan Ilmu Kimia*, 8(3), 1–9. <https://doi.org/http://dx.doi.org/10.31602/dl.v8i3.20898>
- Poernomo, H., Taha, M., & Dewi, A. S. (2023). LD50 Acute Toxicity Test of Green Grass Jelly (Cyclea barbata Miers) Leaf Extract Against Mice (Mus musculus L.). *Interdental Jurnal Kedokteran Gigi*, 19(1), 67–73. <https://doi.org/10.46862/interdental.v19i1.6544> ABSTRACT

- Prabhu, R., Fernandes, R., & Govinda, K. A. (2021). Phytoconstituents Isolation and Hepatoprotective Activity Potential of Averrhoa bilimbi Leaf Extract. *Journal of Pharmaceutical Research International*, 33(58B), 573–581. <https://doi.org/10.9734/JPRI/2021/v33i58B34239>
- Pramiastuti, O., Rejeki, D. S., Maghfiroh, I., & Firsty, G. R. (2020). Uji Antibakteri Kombinasi Ekstrak Daun Belimbing Wuluh (Averrhoa bilimbi L.) Dan Daun Kersen (Muntingia calabura L.) Terhadap Staphylococcus aureus. *Parapemikir : Jurnal Ilmiah Farmasi*, 9(2), 33–41. <https://doi.org/10.30591/pjif.v>
- Putri, R. G., Safithri, M., Husnawati, H., & Kurniasih, R. (2023). Penambatan Molekuler Senyawa Aktif Sirih Merah (Piper crocatum) pada Butirilkolinesterase sebagai Kandidat Antialzheimer. *ALCHEMY Jurnal Penelitian Kimia*, 19(1), 68–85. <https://doi.org/10.20961/alchemy.19.1.59676.68-85>
- Putri, T. Z. A. D., Findrayani, R. P., Isrul, M., & Lolok, N. (2024). Studi Molecular Docking Senyawa Kimia Dari Herba Putri Malu (Mimosa pudica) Terhadap Inhibisi Enzim A-Glukosidase Sebagai Antidiabetes Melitus. *Jurnal Pharmacia Mandala Waluya*, 3(4), 225–233. <https://doi.org/10.54883/jpmw.v3i4.104>
- Rafeeq, M. M. (2022). Molecular Docking Analysis of Phytochemicals with Estrogen Receptor Alpha. *Bioinformation*, 18(8), 697–702. <https://doi.org/10.6026/97320630018697>
- Rahimah, S., Ba, F. M., & Limbong, B. A. (2019). The Toxicity Test of Ethanol Extract of Leaves Averrhoa bilimbi L . Using Brine Shrimp Lethality Test (BSLT) Uji Toksisitas Ekstrak Etanol Daun Belimbing Wuluh (Averrhoa bilimbi L.) Menggunakan Metode Brine Shrimp Lethality Test. *Journal of Pharmaceutical and Medicinal Sciences*, 4(1), 10–14.
- Rajagopal, K., Kalusalingam, A., Bharathidasan, A. R., Sivaprakash, A., Shanmugam, K., Sundaramoorthy, M., & Byran, G. (2023). In Silico Drug Design of Anti-Breast Cancer Agents. *Molecules*, 28(10), 4175. <https://doi.org/10.3390/molecules28104175>
- Ramadhan, M. A., Sabawi, H., Syafriadi, R., Suryani, O., & Azra, F. (2025). Extraction of Morinda Citrifolia Leaves Essential Oils as EGFR Inhibitor in Non- Small Cells Lung Cancer : In Silico Approach. *Indonesian Journal of Chemical Science*, 14(2), 1–11.
- Rizka, A., Iqbal, T. Y., & M, A. M. (2022). Age Related to Breast Cancer Incidence in Cut Meutia Regional General Hospital Northern Aceh. *Open Access Indonesian Journal of Medical Reviews*, 2(3), 229–233. <https://doi.org/10.37275/oaijmr.v2i3.190>
- Rochmawa, L., Prabawati, S., & Djalaluddin, N. M. (2021). *Pemeriksaan*

- Payudara Sendiri (SADARI)* (Y. S. Rosyad (ed.); 1st ed.). Zahir Publishing.
- Ryan, M., Rahardhian, R., Murti, B. T., Wigati, D., Suharsanti, R., & Putri, C. N. (2019). Solvent Concentration Effect on Total Flavonoid and Total Phenolic Contents of Averrhoa bilimbi Leaf Extract. *Pharmaciana*, 9(1), 137–144. <https://doi.org/10.12928/pharmaciana.v>
- Sagitasa, S., Elizabeth, K., Sulaeman, L. I., Rafasafly, A., Syafra, D. W., Kristande, A., & Muchtaridi, M. (2021). Studi In Silico Senyawa Aktif Daun Singawalang (*Petiveria alliacea*) Sebagai Penurun Kadar Glukosa Darah Untuk Pengobatan Penyakit Diabetes Melitus Tipe-2. *Chimica et Natura Acta*, 9(2), 58–66. <https://doi.org/https://doi.org/10.24198/cna.v9.n2.340>
- Santi, T. D., & Candra, A. (2023). Skrining Fitokimia dan Karakteristik Salep Daun Averrhoa Bilimbi. *BIOMA : Jurnal Biologi Makasar*, 8(1), 23–31.
- Sari, A. K., Ayuchecaria, N., Rizki Febrianti, D., Alfiannor, M. M., & Regitasari, V. (2019). Analisis Kuantitatif Kadar Flavonoid Ekstrak Etanol Daun Belimbing Wuluh (*Averrhoa bilimbi* L.) Di Banjarmasin Dengan Metode Spektrofotometri Uv-Visible. *Jurnal Insan Farmasi Indonesia*, 2(1), 7–17.
- Sari, I. W., Junaidin, & Pratiwi, D. (2020). Molecular Docking Study Flavonoid Compounds from Kumis Kucing (*Orthosiphon stamineus* B.) in α -Glukosidase Receptor as Antidiabetic Type 2. *Jurnal Farmagazine*, VII(2), 54–60. <https://doi.org/10.47653/farm.v7i2.194>
- Sari, L. A. (2019). Efektivitas Media Booklet dan Leaflet Terhadap Pengetahuan Remaja Putri Tentang Dampak Kehamilan Remaja. *Jambura Journal of Health Sciences and Research*, 1(2), 47–53. <https://doi.org/https://doi.org/10.35971/jjhsr.v1i2.2388>
- Sari, P. L., Jamhuri, M., & Yusuf, A. (2025). Pengembangan Budaya Religius untuk Menanamkan Nilai-Nilai Karakter pada Peserta Didik di MA Darut Taqwa. *Risalah: Jurnal Pendidikan Dan Studi Islam*, 11(3), 1183–1193.
- Sary, A. L., & Isnawati. (2023). Pengembangan Media Pembelajaran Booklet Berbasis Edible Mushroom pada Materi Fungi untuk Meningkatkan Minat Berwirausaha Siswa Biologi Kelas X SMA. *BioEdu*, 12(1), 218–228.
- Serli, S. P., Riga, R., & Nasra, E. (2024). Kajian Fitokimia Ekstrak Metanol Daun Belimbing Wuluh (*Averrhoa bilimbi* L.) Asal Kecamatan Koto Tangah. *MASALIQ: Jurnal Pendidikan Dan Sains*, 4(5), 1004–1018. <https://doi.org/https://doi.org/10.58578/masaliq.v4i5.3447>
- Setiawan, F. F., & Istyastono, P. (2015). Uji in Silico Senyawa 2,6-Dihidroksiantraquinon Sebagai Ligan Pada Reseptor Estrogen Alfa. *Jurnal Farmasi Sains Dan Komunitas*, 12(2), 77–80.
- Setyawan, H. Y., Sukardi, S., & Nareswari, B. F. (2021). The phytochemical potential of Averrhoa bilimbi - A review. *IOP Conference Series: Earth and Environmental Science*, 733(1). <https://doi.org/10.1088/1755->

1315/733/1/012091

- Sharma, D., Kumar, S., & Narasimhan, B. (2018). Estrogen Alpha Receptor Antagonists for The Treatment of Breast Cancer: a Review. *Chemistry Central Journal*, 12(107), 1–32. <https://doi.org/10.1186/s13065-018-0472-8>
- Shofi, M. (2021). Studi In Silico Senyawa Kuarsetin Daun Kencana Ungu (*Ruellia tuberosa* L .) Sebagai Agen Antikanker Payudara. *Jurnal Sintesis*, 2(April), 1–9.
- Shtaiwi, A., Adnan, R., Khairuddeanb, M., & Khan, S. U. (2019). Computational Investigations of The Binding Mechanism of Novel Benzophenone Imine Inhibitors for The Treatment of Breast Cancer. *Royal Society of Chemistry*, 9, 35401–35416. <https://doi.org/10.1039/c9ra04759j>
- Silalahi, M. (2021). Pemanfaatan dan Bioaktivitas Bilimbing Wuluh (*Averrhoa bilimbi* L.). *Titian Ilmu: Jurnal Ilmiah Multi Sciences*, 13(1), 39–45. <https://doi.org/10.30599/jti.v13i1.843>
- Silalahi, M., & Mustaqim, W. A. (2020). *Tumbuhan Berbiji di Jakarta Jilid 1: 100 Jenis-Jenis Pohon Terpilih* (T. Setiawati (ed.); 1st ed.). UKI Press.
- Silalahi, M., & Sihotang, H. (2019). Keanekeragaman Tumbuhan yang diperjual-belikan di Nurseri Kranggan, Bekasi, Jawa Barat. *Sainmatika: Jurnal Ilmiah Matematika Dan Ilmu Pengetahuan Alam*, 16(2), 98–109. <https://doi.org/10.31851/sainmatika.v16i2.2828>
- Siregar, Y. A., Montesqrit, & Harnentis. (2023). Potensi Fitokimia Daun Belimbing Wuluh (*Averrhoa bilimbi* L.) dengan Pengeringan Berbeda sebagai Kandidat Antibiotik Alami Broiler. *AGRIVET: Jurnal Ilmu Pertanian Dan Peternakan*, 11(01), 37–44. <https://doi.org/https://doi.org/10.31949/Agrivet/V11i2.5746>
- Sjamsuhidajat, & Jong, D. (2017). *Buku Ajar Ilmu Bedah Sistem Organ dan Tindak Bedahnya (1)* (4th ed.). Penerbit Buku Kedokteran.
- Smolarek, A. K., & Suh, N. (2011). Chemopreventive Activity of Vitamin E in Breast Cancer: A Focus on γ - and δ -Tocopherol. *Nutrients*, 3, 962–986. <https://doi.org/10.3390/nu3110962>
- Spasov, D. S. (2024). Binding Affinity Determination in Drug Design : Insights from Lock and Key , Induced Fit , Conformational Selection , and Inhibitor Trapping Models. *International Journal of Molecular Sciences*, 25(7124), 1–24. <https://doi.org/https://doi.org/10.3390/ijms25137124>
- Sugiyono. (2020). *Metode Penelitian Kuantitatif, Kualitatif dan R&DMetode Penelitian Kuantitatif, Kualitatif dan R&D* (1st ed.). ALFABETA CV.
- Suherman, Maliza, R., Syahbanu, F., Supardan, A. D., Rita, R. S., Arisanty, D., Minarsih, T., Yerizel, E., Amrinanto, A. H., Handito, D., & Jati, M. A. S. (2024). *Analisis Zat Gizi Pangan Teori Dan Praktik* (Desmawati & L. Atoy (eds.); 1st ed.). EUREKA MEDIA AKSARA.

- Sukmawati, & Asmaliani, I. (2019). Ekstrak Etanol Daun Pandan Wangi (*Pandanus amaryllifolius* Roxb sebagai Antinefrotoksitas Berdasarkan Penurunan Kadar Kreatinin Tikus. *As-Syifaa Jurnal Farmasi*, 11(02), 93–98.
- Suriyeni, D., Mukarromah, Z., & Ridho, M. R. (2024). Eksplorasi Molecular Docking Senyawa Flavonoid *Orthosiphon stamineus* B. Reseptor Enzim Siklooksigenase (COX) Sebagai Antiinflamasi. *Blantika: Multidisciplinary Journal*, 2(8), 782–789. <https://doi.org/https://doi.org/10.57096/blantika.v2i8.191>
- Surya, S. A., Amarilis, B., Parida, N., Hafidz, M., Azzahra, R. S. S., & Abdullah, A. (2024). In Silico Study of the Antidiabetic Activity of Secondary Metabolites from Noni Fruit (*Morinda citrifolia* L.) Against PPAR γ Receptors. *INNOVATIVE: Journal Of Social Science Research*, 4, 5253–5266. <https://doi.org/DOhttps://doi.org/10.31004/innovative.v4i5.15537>
- Teimouri, H., Haghighijoo, Z., Baumgartner, T. J., Singh, A. K., Wadsworth, P. A., Zhang, C., Chen, H., Zhou, J., & Laezza, F. (2025). Uncovering molecular determinants of potency and binding affinity in hit compounds targeting FGF14/Nav1.6 complex. *Journal of Cheminformatics*, 17(176), 1–16. <https://doi.org/https://doi.org/10.1186/s13321-025-01122-0>
- Thakur, G. S., Gupta, A. K., Pal, D., Vaishnav, Y., Kumar, N., Annadurai, S., & Jain, S. K. (2025). Designing novel cabozantinib analogues as p-glycoprotein inhibitors to target cancer cell resistance using molecular docking study , ADMET screening , bioisosteric approach , and molecular dynamics simulations. *Frontiers in Chemistry*, 13, 1–24. <https://doi.org/10.3389/fchem.2025.1543075>
- Tilakvijay, J., Babu, K. V., & Uma, A. (2019). Virtual Screening of Novel Compounds as Potential ER α Inhibitors. *Bioinformation*, 15(5), 321–332. <https://doi.org/10.6026/97320630015321>
- Trujillo, L., Bedoya, J., Cortés, N., Osorio, E. H., Gallego, J.-C., Leiva, H., Castro, D., & Osorio, E. (2023). Cytotoxic Activity of Amaryllidaceae Plants against Cancer Cells: Biotechnological, In Vitro, and In Silico Approaches. *Molecules* 2023, 28, 1–18. <https://doi.org/https://doi.org/10.3390/molecules28062601>
- Widiastuti, D., Sinaga, S. E., Warnasih, S., Syahputri, Y., Saputri, N. B., Sustiprijatno, & Putra, W. E. (2024). Antidiabetic Activity of *Averrhoa bilimbi* L. Fruit Extracts and the Identification of Active Compounds Using LC-MS and In silico Methods. *Indonesian Journal of Pharmacy*, 35(2), 282–291. <https://doi.org/10.22146/ijp.7746>
- Wong, P. Lou, Fauzi, N. A., Norhamimah, S., Yunus, M., Khaleeda, N., Zolkeflee, Z., & Abas, F. (2020). Biological Activities of Selected Plants and Detection of Bioactive Compounds from *Ardisia elliptica* Using UHPLC-Q-

- Exactive Orbitrap Mass Spectrometry. *Molecules*, 25(3067), 1–15. <https://doi.org/10.3390/molecules25133067>
- Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, 05(02), 3928–3936.
- Xue, Q., Liu, X., Russell, P., Li, J., Pan, W., Fu, J., & Zhang, A. (2022). Ecotoxicology and Environmental Safety Evaluation of the binding performance of flavonoids to estrogen receptor alpha by Autodock , Autodock Vina and Surflex-Dock. *Ecotoxicology and Environmental Safety*, 233, 113323. <https://doi.org/10.1016/j.ecoenv.2022.113323>
- Yanti, S., & Vera, Y. (2019). Skrining Fitokimia Ekstrak Daun Belimbing Wuluh (*Averrhoa bilimbi*). *Jurnal Kesehatan Ilmiah Indonesia (Indonesian Health Scientific Journal)*, 4(2), 41–46.
- Yudistira, O. K., Syamsurizal, Helendra, & Attifah, Y. (2021). Analisis Kebutuhan Pengembangan Booklet Sistem Imun Manusia sebagai Suplemen Bahan Ajar Biologi Kelas XI SMA. *Journal for Lesson and Learning Studies*, 4(1), 39–44. <https://doi.org/https://doi.org/10.23887/jlls.v4i1.34289>