

## DAFTAR PUSTAKA

- Anani, K., Adjrah, Y., Ameyapoh, Karou, S.D., Agbonon, A., de Souza, C., Gbeassor, M., 2016. Antimicrobial, anti-inflammatory and antioxidant activities of *Jatropha multifida* L. (Euphorbiaceae). *Pharmacognosy. Res.* 8(2):142-6.
- Ahmad, S.A.A., Palanisamy, U.D., Tejo, B.A., Chew, M.F., Tham, H.W., Hassan, S.S., 2017. Geraniin extracted from the rind of *Nephelium lappaceum* binds to dengue virus type-2 envelope protein and inhibits early stage of virus replication. *Viol. J.* 14(229).
- Allard, P.M., Leyssen, P., Martin, M.T., Bourjot, M., Dumontet, V., Eydoux, C., *et al.*, 2012. Antiviral chlorinated daphnane diterpenoid orthoesters from the bark and wood of *Trigonostemon cherrieri*. *Phytochemistry* 84:160-8.
- Aoki-Utsubo, C., Chen, M., Hotta, H., 2018. Time-of-addition and temperature-shift assay to determine particular step(s) in the viral life cycle that is blocked by antiviral substance(s). *Bio. Protoc.* 8(09).
- Aryantini, D., Sari, E.A., Nanda, D., 2020. Karakteristik spesifik ekstrak daun yodium (*Jatropha multifida* L.) dari tiga lokasi tempat tumbuh di Jawa Timur. *Journal of Pharmacy Science and Technology* 2(2):156-62.
- Back, A.T., dan Lundkvist, A., 2013. Dengue virus - an overview. *Infect. Ecol. Epidemiology.* 3(19839).

Balai Penelitian Tanaman Rempah dan Obat (Balittro). 2021. *Jatropha multifida*.

[cited 2021 August 20]. Available from: URL:

[https://balittro.litbang.pertanian.go.id/?page\\_id=5525](https://balittro.litbang.pertanian.go.id/?page_id=5525).

Barbosa, E.C., Alves, T.M.A., Kohlhoff, M., Jangola, S.T.G., Pires, D.E.V.,

Figueiredo, A.C.C., et al., 2022. Searching for plant-derived antivirals against dengue virus and Zika virus. *Viol. J.* 19(1):31.

Bartenschlager, R., dan Miller, S., 2008. Molecular aspects of dengue virus replication. *Future Microbiol.* 3(2):155-65.

Balunas, M.J., Kinghorn, A.D., 2005. Drug discovery from medicinal plants. *Life Sci.* 78(5):431-41.

Begg ,J., Gaskin, T., 1994. *Jatropha multifida*. Inchem [online] [cited 3 August 2021]. Available from:

<http://www.inchem.org/documents/pims/plant/jmulti.htm>.

Behnam, M.A.M., Nitsche, C., Boldescu, V., Klein, C.D., 2016. The medicinal chemistry of dengue virus. *J. Med. Chem.* 59:5622-49.

Bele, A.A., Khale, A., 2011. An overview on thin layer chromatography. *Int. J. Pharm. Sci. Res.* 2(2); 256-67.

Bhatnagar, P., Sreekanth, G.P., Murali-Krishna, K., Chandele, A., Sitaraman, R., 2021. Dengue Virus Non-Structural Protein 5 as a Versatile, Multi-Functional Effector in Host-Pathogen Interaction. *Front. Cell. Infect. Microbiol.* 11:574067.

- Boniface, P.K., Ferreira, E.I., 2019. Flavonoids as efficient scaffolds: Recent trends for malaria, leishmaniasis, Chagas disease, and dengue. *Phytother. Res.* 1-45.
- Bouriche, H., Selloum, L., Tigrine, C., Boudoukha, C., 2003. Effect of *Cleoma arabica* leaf extract on rat paw oedema and human neutrophil migration. *Pharm. Biol.* 41:10-5.
- BPOM. 2020. Potensi Obat Herbal Indonesia. [online] [cited 13 December 2021]. Available from: <https://www.pom.go.id/new/view/more/pers/531/Potensi-Obat-Herbal-Indonesia.html>.
- CCRC. 2013. Protokol Uji Sitotoksik Metode MTT. Yogyakarta. Fakultas Farmasi UGM.
- Coulerie, P., Maciuk, A., Eydoux, C., Hnawia, E., Lebouvier, N., Figadee, B., et al., 2014. New inhibitor of the DENV-NS5 RdRp from *Carpolepis laurifolia* as potential antiviral drugs for dengue treatment. *Rec. Nat. Prod.* 8(3): 286-9.
- Das, B., Laxminarayana, K., Krishnaiah, M., Srinivas, Y., Raju, T.V., 2009a. Multidione, a novel diterpenoid from *Jatropha multifida*. *Tetrahedron Lett.* 50(34):4885-7.
- Das, B., Reddy, K.R., Ravikanth, B., Raju, T.V., Sridhar, B., Khan, P.U., et al., 2009b. Multifidone: a novel cytotoxic lathyrane-type diterpene having an unusual six-membered A ring from *Jatropha multifida*. *Bioorg. Med. Chem. Lett.* 19:77-9.
- de Carvalho, C., Mariano, L.V., Negrao, V.S., Goncalves, C.P., Marcucci, M.C.R., 2018. Phenols, flavonoids and antioxidant activity of *Jatropha multifida* L.

collected in Pindamonhangaba, Sao Paulo State, Brazil. *J. Anal. Pharm. Res.* 7(5):581-4.

Diosa-Toro, M., Troost, B., van de Pol, D., Heberle, A.M., Urcuqui-Inchima, S., Thedieck, K., *et al.*, 2019. Tomatidine, a novel antiviral compound towards dengue virus. *Antivir. Res.* 161:90-9.

Ellan, K., Thayan, R., Raman, J., Hidari, K.I.P.J., Ismail, N., Sabaratnam, V., 2019. Anti-viral activity of culinary and medicinal mushroom extracts against dengue virus serotype 2: an in-vitro study. *BMC Complement. Altern. Med.* 19:260.

Falodun, A., Imieje, V., Erharuyi, O., Joy, A., Langer, P., Jacob, M. *et al.*, 2014. Isolation of antileishmanial, antimalarial and antimicrobial metabolites from *Jatropha multifida*. *Asian. Pac. J. Trop. Biomed.* 4(5):374-8.

Falodun, A., Igbe, I., Erharuyi, O., Agbanyim, O.J., 2013. Chemical characterization, anti inflammatory and analgesic properties of *Jatropha multifida* root bark. *J. Appl. Sci. Environ. Manage.* 17(3):357-62.

Gomez-Calderon, C., Mesa-Castro, C., Robledo, S., Gomez, S., Bolivar-Avila, S., Diaz-Castillo, F., Martinez-Gutierrez, M., 2017. Antiviral effect of compounds derived from the seeds of *Mammea americana* and *Tabernaemontana cymosa* on Dengue and Chikungunya virus infection. *BMC Complement. Altern. Med.* 17:57.

Gonzalez, M.P., Benedi, J., Bermejo-Bescos, P., Sagrario, M., 2019. Plants with evidence-based therapeutic effect against neurodegenerative diseases. *Pharm. Pharmacol. Int. J.* 7(5):221-7.

Gurukumar, K.R., Priyadarshini, D., Patil, J.A., Bhagat, A., Singh, A., Shah, P.S., Cecilia, D., 2009. Development of real time PCR for detection and quantification of dengue virus. *Viol. J.* 6:10.

Hamza, O.M.J., van den Beukel, C.J.P.B., Matee, M.I.N., Moshi, M.J., Mikx, F.H.M., Selemani, H.O., 2006. Antifungal activity of some Tanzanian plants used traditionally for the treatment of fungal infections. *J. Ethnopharmacol.* 108(1):124-32.

Hikmah, S.N., Setianto, R., Dewi, B.A., Utami, R., 2021. Antibacterial activities of N-hexan ethyl acetate fraction and water from ethanol extract of yodium leaves (*Jatropha multifida* L) against *Pseudomonas aeruginosa* ATCC 27853. *Strada Jurnal Ilmiah Kesehatan* 10(1):1242-9.

Hirota, B.C.K., Miyazaki, C.M.S., Mercali, C.A., Verdan, M.C., Kalegari, M., Gemin, C., *et al.*, 2012. C-glycosyl flavones and a comparative study of the antioxidant, hemolytic and toxic potential of *Jatropha multifida* leaves and bark. *Int. J. Phytomedicine.* 4:01-5.

Indrayani, Y.A., Wahyudi, T., 2018. *Situasi Penyakit Demam Berdarah di Indonesia Tahun 2017*. Infodatin Pusat Data dan Informasi Kementerian Kesehatan RI, Jakarta.

Issur, M., Geiss, B.J., Bougie, I., Picard-Jean, F., Despins, S., Mayette, J., et al., 2009. The flavivirus NS5 protein is true RNA guanylyltransferase that catalyzes a two-step reaction to form the RNA cap structure. *RNA* 15:2340-2350.

Ivan, Sudigdoadi, S., Kartamihardja, A.H.S., 2019 Antibacterial effect of *Jatropha multifida* L. leaf infusion towards *Staphylococcus aureus* and *Pseudomonas aeruginosa*. *Althea Medical Journal* 6(2):95-9.

Juffrie, M., van der Meer, G.M., Hack, C.E., Haasnoot, K., Sutaryo, Veerman, A.P., 2000. Inflammatory mediators in dengue virus infection in children: interleukin-8 and its relationship to neutrophil degradation. *Infect. Immun.* 68(2): 702-7.

Juniarti, Aryenti, Yuhernita, Poerwaningsih, E.H., Jusuf, A.A., Freisleben, H.J., et al., 2012. Effects of methanolic *Jatropha multifida* L. extract in wound healing assessed by the total number of PMN leukocytes and fibroblasts. *Makara. J. Sci.* 16(3):178-82.

Kangussu, L.M., Costa, V.V., Olivon, V.C., Queiroz-Junior, C.M., Gondim, A.N.S., Melo, M.B., et al., 2022. Dengue virus infection induces inflammation and oxidative stress on the heart. *Heart* 108: 388-96.

Karyati, Adhi, M.A., 2018. *Jenis-jenis Tumbuhan Bawah di Hutan Pendidikan Fakultas Kehutanan Universitas Mulawarman*. Mulawarman University Press. Samarinda.

Katiyar, C., Gupta, A., Kanjilal, S., Katiyar, S., 2012. Drug discovery from plant sources: An integrated approach. *AYU* 33(1):10-9.

Kato, F., Ishida, Y., Oishi, S., Fujii, N., Watanabe, S., Vasudevan, S.G., *et al.*, 2016. Novel antiviral activity of bromocriptine against dengue virus replication. *Antivir. Res.* 131:141-7.

Kaushik, S., Dar, L., Kaushik, S., Yadav, J.P., 2021. Identification and characterization of new potent inhibitors of dengue virus NS5 proteinase from *Andrographis paniculata* supercritical extracts on in animal cell culture and in silico approaches. *J. Ethnopharmacol.* 267:113541.

Kemenkes RI. 2020. Hingga Juli, Kasus DBD di Indonesia Capai 71 Ribu. [online] [cited 11 December 2020]. Available from: <https://www.kemkes.go.id/article/view/20070900004/hingga-juli-kasus-dbd-di-indonesia-capai-71-ribu.html>.

Koparde, A.A., Doijad, R.C., Magdum, C.S., 2019. Natural products in drug discovery. *IntechOpen* DOI: 10.5772/intechopen.82860.

Kosasi, S., 't Hart, L.A., van Dijk, H., Labadie, R.P., 1989. Inhibitory activity of *Jatropha multifida* latex on classical complement pathway activity in human serum mediated by a calcium-binding proanthocyanidin. *J. Ethnopharmacol.* 27:81-9.

Kumar, S., Jyotirmayee, K., Sarangi, M., 2018. Thin layer chromatography: a tool of biotechnology for isolation of bioactive compounds from medicinal plants. *Int J Pharm Sci Rev Res* 18(1): 126-32.

Labadie, R.P., van der Nat, J.M., Simons, J.M., Kroes, B.H., Kosasi, S., van den

Berg, A.J.J., et al., 1989. An ethnopharmacognostic approach to the search for immunomodulators of plant origin. *Planta Medica* 55:339-48.

Lim, S.Y.M., Chieng, J.Y., Pan, Y., 2021. Recent insights on anti-dengue virus (DENV) medicinal plants: review on in vitro, in vivo and in silico discoveries. *All Life* 14(1); 1-33.

Limjindaporn, T., Panaampon, J., Malakar, S., Noisakran, S., Yenchitsomanus, P., 2017. Tyrosine kinase/phosphatase inhibitors decrease dengue virus production in HepG2 cells. *Biochem. Biophys. Res. Commun.* 483(1):58-63.

Low, J.G.H., Ooi, E.E., Vasudevan, S.G., 2017. Current status of dengue therapeutics research and development. *J. Infect. Dis.* 215:S96-S102.

Marliana, S.D., Suryanti, V., Suyono., 2005. Skrining fitokimia dan analisis kromatografi lapis tipis komponen kimia buah labu siam (*Sechium edule* Jacq. Swartz. ) dalam ekstrak etanol. *Biofarmasi* 3(1):26-31.

Martinez-Guiterrez, M., 2019. In vitro and in silico anti-dengue activity of compounds obtained from *Psidium guajava* through bioprospecting. *BMC Complement. Altern. Med.* 19:298.

Medina, F., Medina, J.F., Colon, C., Vergne, E., Santiago, G.A., Munoz-Jordan, J.L., 2012. Dengue virus: isolation, propagation, quantification, and storage. *Curr. Protoc. Microbiol.* 15D.2.1-15D.2.24.



- Min, N., Leong, P.T., Lee, R.C.H., Khuan, J.S.E., Chu, J.J.H., 2018. A flavonoid compound library screen revealed potent antiviral activity of plant-derived flavonoids on human enterovirus A71 replication. *Antivir. Res.* 150:60-68.
- Norazharuddin, H., Lai, N.S., 2018. Roles and prospects of dengue virus non-structural protein targets: an easy digest. *Malays. J. Med. Sci.* 25(5):6-15.
- Obi, J.O., Gutierrez-Barbosa, H., Chua, J.V., Deredge, D.J., 2021. Current trends and limitations in dengue antiviral research. *Trop. Med. Infect. Dis.* 6(180).
- Paintsil, E., Cheng, Y., 2009. Antiviral agents. *Encyclopedia of Microbiology* 223-57.
- Panraksa, P., Ramphan, S., Khongwichit, S., Smith, D.R., 2017. Activity of andrographolide against dengue virus. *Antivir. Res.* 139:69-78.
- Paranjape, S.M., Harris, E., 2010. Control of dengue virus translation and replication. In Rothman A (eds) *Dengue Virus. Current Topics in Microbiology and Immunology*. vol 338. Springer, Berlin, Heidelberg.
- Peng, M., Watanabe, S., Chan, K.W.K., He, Q., Zhao, Y., Zhang, Z., et al., 2017. Luteolin restricts dengue virus replication through inhibition of the proprotein convertase furin. *Antivir. Res.* 143:176-85.
- Pillai, A.B., Muthuraman, K.J., Mariappan, V., Belur, S.S., Lokesh, S., Rajendiran, S., 2019. Oxidative stress response in the pathogenesis of dengue virus virulence, disease prognosis and therapeutics: an update. *Arch. Virol.* 164: 2895-908.

- Pu, J., He, L., Xie, H., Wu, S., Li, Y., Zhang, P. *et al.*, 2017. Antiviral activity of carbenoxolone disodium against dengue virus infection. *J. Med. Virol.* 89(4):571-81.
- Rampadarath, S., PUNCHOOA, D., Ranghoo-Sanmukhiya, V.M., 2014a. A comparison of polyphenolic content, antioxidant activity and insecticidal properties of *Jatropha* species and wild *Ricinus communis* L. found in Mauritius. *Asian. Pac. J. Trop. Med.* 7S1:S384-90.
- Roa-Linares, V.C., Brand, Y.M., Agudelo-Gomez, L.S., Tangarife-Castano, V., Betancur-Galvis, L.A., Gallego-Gomez, J.C., *et al.*, 2016. Anti-herpetic and anti-dengue activity of abietane ferruginol analogues synthesized from (+)-dehydroabietylamine. *Eur. J. Med. Chem.* 108:79-88.
- Rodenhuis-Zybert, I.A., Wilschut, J., Smit, J.M., 2010. Dengue virus life cycle: viral and host factors modulating infectivity. *Cell. Mol. Life Sci.* 67:2773-86.
- Sabandar, C.W., Ahmat, N., Jaafar, F.M., Sahidin, I., 2013. Medicinal property, phytochemistry and pharmacology of several *Jatropha* species (Euphorbiaceae): A review. *Phytochemistry* 85:7-29.
- Sahili, A.E., Lescar, J., 2017. Dengue virus non-structural protein 5. *Viruses* 9(4):91.
- Santiago, M., Strobel, S., 2013. Thin layer chromatography. *Methods Enzymol* 533:303-24.
- Shoji, M., Woo, S., Masuda, A., Win, N.N., Ngwe, H., Takahashi, E., *et al.*, 2017. Anti-influenza virus activity of extracts from the stems of *Jatropha multifida* Linn. collected in Myanmar. *BMC Complement. Altern. Med.* 17(1):96.

Sivaraman, D., Pradeep, P.S., 2020. Exploration of bioflavonoid targeting dengue virus NS5 RNA-dependent RNA polymerase: in silico molecular docking approach. *J. App. Pharm. Sci.* 10(05):016-022.

Sundaryono, A., Listiono, A.E., Jumika, R., Yahya, R., 2019. Potential test development of dengue hemorrhagic fever medicine from *Jatropha multifida* stem bark as organic chemistry teaching material. *J Phys: Conf Ser* 1233:012024.

't Hart, B.A., Copray, S., Philippens, I., 2014. Apocynin, a low molecular oral treatment for neurodegenerative disease. *BioMed Res. Int.* 298020.

Tan, Y.P., Houston, S.D., Modhiran, N., Savchenko, A.I., Boyle, G.M., Young, P.R., *et al.*, 2019. Stachyonic acid: a dengue virus inhibitor from *Basilicum polystachyon*. *Chem. Eur. J.* 2019; 25:1-5.

Thomas, L., Najioullah, F., Besnier, F., Valentino, R., Cesaire, J.R.R., Cabie, A., 2014. Clinical presentation of dengue by serotype and year of epidemic in Martinique. *Am. J. Trop. Med. Hyg.* 91(1):138-45.

Thomas, S., 2016. Pharmacognostic and phytochemical constituents of leaves of *Jatropha multifida* Linn. and *Jatropha podagrica* Hook. *J Pharmacogn. Phytochem.* 5(2):243-6.

Tohma, D., Tajima, S., Kato, F., Sato, H., Kakisaka, M., Hishiki, T., *et al.*, 2019. An estrogen antagonist, cyclofenil, has anti-dengue-virus activity. *Arch. Virol.* 164: 225-34.

Troost, B., Smit, J.M., 2020. Recent advances in antiviral drug development towards dengue virus. *Curr. Opin. Virol.* 43:9-21.

Trujillo-Correa, A.I., Quintero-Gil, D.C., Diaz-Castillo, F., Quinones, W., Robledo, S.M., Tuzimski, T., 2019. In vitro and in silico anti-dengue activity of compounds obtained from *Psidium guajava* through bioprospecting. *BMC Complement. Altern. Med.* 19(298).

Wahyuningsih, M.S.H., 2021. Secondary metabolite and its identification methods [Presentasi Power Point]. Virtual Summer Course 2021. Yogyakarta

Wangikar, P., Martis, E.A.F., Ambre, P.K., Nandan, S., Coutinho, E.C., 2016. Update on methyltransferase inhibitors of the dengue virus and further scope in the field. *J. Emerg. Infect. Dis.* 1:108.

Werdyani, S., Fitria, A., Rakhmawati, S., 2020. In vitro tracing of cytotoxic compounds in jarak cina stem bark (*Jatropha multifida* Linn.). *Journal of Sciences and Data Analysis* 1(1):7-13.

WHO. 2020. Dengue and Severe Dengue. [online] [cited 11 December 2020]. Available from: <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>.

WHO. 2011. Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Haemorrhagic Fever: Revised and Expanded Edition. *WHO SEARO*, India.

Wolff, T., Berrueta, L.A., Valente, L.M.M., Barboza, R.S., Neris, R.L.S., Guimaraes-Andrade, I.P. *et al.*, 2018. Comprehensive characterization of polyphenols in leaves and stems of three anti-dengue virus type-2 active

Brazilian *Faramea* species (Rubiaceae) by HPLC-DAD-ESI-MS/MS.

*Phytochem. Anal.* 2018:1-11.

Woo, S.Y., Wong, C.P., Win, N.N., Lae, K.Z.W., Woo, B., Elsabbagh, S.A., *et al.*, 2019. Anti-melanin deposition activity and active constituents of *Jatropha multifida* stems. *J. Nat. Med.* 73:805-13.

Yao, X., Ling, Y., Guo, S., Wu, W., He, S., Zhang, Q., *et al.*, 2018. Tatanan A from the *Acorus calamus* L. root inhibited dengue virus proliferation and infection. *Phytomedicine* 42:258-67.

Yu, J.S., Tseng, C.K., Lin, C.K., Hsu, Y.C., Wu, Y.H., Hsieh, C.L., *et al.*, 2017. Celastrol inhibits dengue virus replication via up-regulating type I interferon and downstream interferon-stimulated responses. *Antivir. Res.* 137:49-57.

Zandi, K., Teoh, B.T., Sam, S.S., Wong, P.F., Mustafa, M.R., AbuBakar, S., 2012. Novel antiviral activity of baicalein against dengue virus. *BMC Complement. Med. Ther.* 12(214).

Zandi, K., Teoh, B.T., Sam, S.S., Wong, P.F., Mustafa, M.R., AbuBakar, S., 2011a. Antiviral activity of four types of bioflavonoid against dengue virus type-2. *Virol. J.* 8: 560.

Zandi, K., Teoh, B.T., Sam, S.S., Wong, P.F., Mustafa, M.R., AbuBakar, S., 2011b. In vitro antiviral activity of fisetin, rutin and naringenin against dengue virus type-2. *J. Med. Plant Res.* 5(23):5534-9.

Zhang, J.S., Zhang, Y., Li, S., Ahmed, A., Tang, G.H., Yin, S., 2018. Cytotoxic macrocyclic diterpenoids from *Jatropha multifida*. *Bioorg. Chem.* 80:511-8.

Zhang, X., Zhang, M., Su, X., Hui, C., Gu, Y., Shi, Q., 2009. Chemical constituents of the plants from genus *Jatropha*. *Chem. Biodivers.* 6:2166-2183.

Zhu, J.Y., Zhang, C.Y., Dai, J.J., Rahman, K., Zhang, H., 2017. Diterpenoids with thioredoxin reductase inhibitory activities from *Jatropha multifida*. *Nat. Prod. Res.* 31(23): 2753-8.