

## DAFTAR PUSTAKA

- Abbade, L. C., Paiva, P. D. D. O., Pavia, R., & Graciano, M. H. P. 2010. Growth Curve and Biochemical Analyses of Callus of Ipe-Branco (*Tabebuia roseoalba* (Ridi.) Sand.). *Naturalia*. 33 : 45-56.
- Abdallah, I. I. & Quax, W. J. 2017. A Glimpse into the Biosynthesis of Terpenoids. *NRLS Conference Proceedings, International Conference on Natural Resources and Life Sciences (2016) - KnE Life Sciences*. 3, (5) : 81–98.
- Achmadi, S.S. 2003. *Kimia Organik. Edisi 11*. Erlangga. Jakarta.
- Afoulous, S., Ferhout, H., Raelison, E.G., Valentin, A., Moukarzel, B., Couderc, F., Bouajila, J. 2013. Chemical composition and anticancer, antiinflammatory, antioxidant and antimalarial activities of leaves essential oil of *Cedrelopsis grevei*. *Food Chem Toxicol*. 56: 352–362.
- Ahmad, N., Faisal M., Anis, M., Aref I. M. 2010. In vitro Callus Induction and Plant Regeneration from Leaf Explants of *Ruta graveolens* L. *South African Journal Of Botany*. 76 : 597-600
- Ahmed, A.B.A., Rao, A.S., Rao, M.V., & Taha, R.M. 2012. Different Wavelengths Light to Induce Physiological Changes Callus for The Biosynthesis of Gymnemic Acid in *Gymnema Sylvestre*. *Agrofood industry hi-tech*. 23, (3) : 31-34.
- Aioi A., Shimizu T., Kuriyama K. 1995. Effect of squalene on superoxide anion generation induced by a skin irritant, lauroylsarcosine. *Int. J. Pharm.* 113:159–164.
- Al-Maskri AY, Hanif MA, Al-Maskari MY, Abraham AS, AlSabahi JN, Al-Mantheri O. 2011. Essential oil from *Ocimum basilicum* (Omani Basil): a desert crop. *Nat Prod Commun*. 6: 1487–1490.
- Al-Rubaye, A. F., Hameed, I. H., & Kadhim, M. J. 2017. A Review: Uses of Gas Chromatography-Mass Spectrometry (GC-MS) Technique for Analysis of Bioactive Natural Compounds of Some Plants. *International Journal of Toxicological and Pharmacological Research*. 9, (1) : 81-85
- Ali, H. A. M., Imad, H. H., & Salah, A. I. 2015. Analysis of bioactive chemical components of two medicinal plants (*Coriandrum sativum* and *Melia azedarach*) leaves using gas chromatography-mass spectrometry (GC-MS). *African Journal of Biotechnology*. 14, (40) : 2812–2830.
- Ali, M., Abbasi, B.H., Ali, G.S. 2015. Elicitation of antioxidant secondary metabolites with jasmonates and gibberellic acid in cell suspension cultures

- of *Artemisia absinthium* L. *Plant Cell, Tissue and Organ Culture (PCTOC)*. 120,(3):1099-106.
- Amin, N., & Claridge, T. 2017. *Quantitative NMR Spectroscopy*. University of Oxford. U.K
- Andaryani, S. (2010). *Kajian penggunaan berbagai konsentrasi BAP dan 2,4-D terhadap induksi kalus jarak pagar (Jatropha curcas L.) secara in vitro*. SKRIPSI. Surakarta: Universitas Sebelas Maret
- Ashokhan S, Othman R, Abd Rahim MH, Karsani SA, Yaacob JS. 2020. Effect of Plant Growth Regulators on Coloured Callus Formation and Accumulation of Azadirachtin, an Essential Biopesticide in *Azadirachta indica*. *Plants (Basel)*. 9, (3) : 352.
- Ayouni, K., Berboucha-Rahmani, M., Kim, H. K., Atmani, D., Verpoorte, R., & Choi, Y. H. 2016. Metabolomic tool to identify antioxidant compounds of *Fraxinus angustifolia* leaf and stem bark extracts. *Industrial Crops and Products*. 88 : 65–77.
- Azren, P. D., Lee, S. Y., Emang, D., & Mohamed, R. 2018. History and perspectives of induction technology for agarwood production from cultivated *Aquilaria* in Asia: a review. *J. For. Res.* 30 : 1–11.
- Badan Litbang Kehutanan. 2015. *Buku Seri IPTEK V Kehutanan*. Kementerian Kehutanan Republik Indonesia. Jakarta.
- Banthorpe DV, Charlwood BV, Francis MJO. 1972. Biosynthesis of monoterpenes. *Chemical Review*. 72 : 115–155
- Banthorpe, D. V., Branch, S. A., C.O. Njar, V., Osborne, M. G., & Watson, D. G. 1986. Ability of plant callus cultures to synthesize and accumulate lower terpenoids. *Phytochemistry*. 25(3), 629–636.
- Bao, L., Luo, Y., Peng, X., Zhou, Y., & Ou, X. 2009. Synthesis and Biological Activity of 3-(2, 8, 9-trioxa-aza-1-germatricyclo [3. 3. 3. 0] undecane-1-yl)-caffeic Acid. *Medicinal Chemistry*. 5 :382-384
- Barden, A., Anak, N. A., Mulliken, T., & Song, M. 2000. *Heart of the Matter: Agarwood Use and Trade and Cites Implementation for Aquilaria malaccensis*. Cambridge (UK): Traffic Network Report.
- Baser HC., & Buchbauer G. 2010. *Handbook of essential oils. Science, technology, and applications*. CRC Press, Taylor & Francis Group. New York
- Benjamin, E. D., Ishaku, G. A., Peingurta, F. A., & Afolabi, A.S. 2019. Callus Culture for the Production of Therapeutic. *American Journal of Plant Biology*. 4, (4) : 76-84.
- Bhat SV, Sivakumar M, Nagasampagi BA. 2005. *Chemistry of natural products*. Narosa. Berlin.

- Bharti, S. K., & Roy, R. 2012. Quantitative <sup>1</sup>H NMR spectroscopy. *TrAC Trends in Analytical Chemistry*. 35 : 5–26
- Bingham, E., Cohrssen, B, Powell., & C.H. 2001. *Patty's Toxicology Volumes 1-9 5th ed.* John Wiley & Sons. New York
- Blanchette, R., & Heuveling, V. B. H. 2009. *Cultivated Agarwood. U.S. Patent No. 7638145.* Minnesota: University of Minnesota
- Blume, Y. B., Krasylenko, Y. A., & Yemets, A.I. 2012. Effects of Phytohormones on the Cytoskeleton of the Plant Cell. *Russian Journal of Plant Physiology*. 59, (4) : 515–529
- Boamponsem, G. A., & Leung, D. W. M. 2017. Use of compact and friable callus cultures to study adaptive morphological and biochemical responses of potato (*Solanum tuberosum*) to iron supply. *Scientia Horticulturae*. 219 : 161–172
- Bostock, R. M., & Stermer, B. A. 1989. Perspectives on Wound Healing in Resistance to Pathogens. *Annu. Rev. Phytopathol.* 27 : 343-371
- Briellmann HL, Setzer WN, Kaufmann PB, Kirakosyan A, Cseke LJ. *Phytochemicals: The chemical components of plants*. In: Cseke LJ, Kirakosyan A, Kaufman PB, Weber S, Duke JA, Briellmann HL, editors. *Natural Products from Plants*. 2nd ed. Boca Raton. CRC Press. Florida
- Buah, J.N., Kawamitsu, Y., Sato, S., & Murayama, S. 1999. Effects of Different Types and Concentrations of Gelling Agents on the Physical and Chemical Properties of Media and the Growth of Banana (*Musa* spp.) in vitro. *Plant Production Science*. 2, (2) : 138-145
- Buddhapriya, A. N., & Senarath, W.T.P.S.K. 2016. In vitro micropropagation of *Gyrinops walla* (Gaertn.) Using leaf disc explants. *Proceedings of 1st International Conference on Bioscience and Biotechnology*. 1 : 11-14
- Byeon, S.M., Jin, M.H., & Jeon, J.H. 2019. Cosmetic composition containing Oriental Herb Fragrance Active Component Tridecane for Skin Benefit Ingredient. KR102013128B1.
- Caputi, L & Aprea, E. 2011. Use of Terpenoids as Natural Flavouring Compounds in Food Industry. *Recent Patents on Food, Nutrition & Agriculture*. 3 : 9-16
- Carrillo, C. M., Cavia, del M., & Alonso-Torre, S.R. (2012). Antitumor effect of oleic acid; mechanism, of action. A review. *Nutr Hosp*. 27, (5) : 1860 – 1865.
- Casanova, E., Moysset, L., & Trillas, M. I. 2008. Effect of Agar Concentration and Vessel Closure on The Organogenesis and Hyperhydricity of Adventitious Carnation Shoot. *Biologi Plantarum*. 52, (1) : 1-8
- Cassan, F., Vanderleyden, J., & Spaepen, S. 2013. Physiological and Agronomical Aspects of Phytohormone Production by Model Plant-Growth-Promoting Rhizobacteria (PGPR) Belonging to the Genus *Azospirillum*. *J Plant Growth Regul*. 33 : 440 – 459

- Celik, Kubra & Togar, Başak & Türkez, Hasan & Taşpınar, Numan. 2014. In vitro cytotoxic, genotoxic, and oxidative effects of acyclic sesquiterpene farnesene. *Turkish Journal of Biology*. 38. 253-259.
- Chadwick M, Trewin H, Gawthrop F, Wagstaff C. 2013. Sesquiterpenoids lactones: Benefits to plants and people. *International Journal of Molecular Sciences*. 14:12780–12805.
- Chandran, H., Meena, M., Barupal, T., & Sharma, K. (2020). Plant tissue culture as a perpetual source for production of industrially important bioactive compounds. *Biotechnology reports (Amsterdam, Netherlands)*. 26 : e00450
- Chehregani A, Mohsenzadeh F, Mirazi N, Hajisadeghian S, Baghali, Z. 2010. Chemical composition and antibacterial activity of essential oils of *Tripleurospermum disciforme* in three developmental stages. *Pharm Biol*. 48: 1280–1284.
- Chen, H. Q., Wei, J. H., Yang, J. S., Zhang, Z., Yang, Y., Gao, Z. H., Sui, C., & Gong, B. 2012. Chemical constituents of agarwood originating from the endemic genus *Aquilaria* plants. *Chem. Biodivers*. 9 : 236–250
- Chen, X., Zhao, X., Deng, Y., Bu, X., Ye, H., & Guo, N. 2019. Antimicrobial potential of myristic acid against *Listeria monocytogenes* in milk. *The Journal of Antibiotics*. 72 : 298-305
- Cheng A-X, Lou Y-G, Mao Y-B, Lu S, Wang L-J, Chen X-Y. 2007. Plant terpenoids: biosynthesis and ecological functions. *J Integr Plant Biol*. 49:179\_86.
- Choi D, Kang W, Park T. 2020. Anti-Allergic and Anti-Inflammatory Effects of Undecane on Mast Cells and Keratinocytes. *Molecules*. 25, (7):1554
- Cordell GA. 1976. Biosynthesis of sesquiterpenes. *Chemical Review*. 76:425–460
- Croteau R, Kutchan, TM, Lewis NG, 2000. *Natural products (secondary metabolites)*. In Buchanan B, Gruissem W, Jones R (Eds.), *Biochemistry and molecular biology of plants*. MD: American Society of Plant Physiologists. Rockville.
- Dantas da Silva LL, Nascimento M, Siqueira Silva DH, Furlan M, da Silva Bolzani V. 2002. Antibacterial activity of a stearic acid derivative from *Stemodia foliosa*. *Planta Med*. 68, (12) : 1137-9.
- Daniel, A.O., & Temikotan, T. 2021. Fatty acid profile, antioxidant and antibacterial effect of the ethyl acetate extract of *Cleistopholis patens*. *Bulletin of Scientific Research*. 3, (1) : 21-31
- Danova, K., Todorova, M., Trendafilova, A., & Evstatieva, L. 2012. Cytokinin and Auxin Effect on the Terpenoid Profile of the Essential Oil and Morphological Characteristics of Shoot Cultures of *Artemisia alba*. *Natural Product Communications*. 7, (8) : 1075-1076.

- Danova, K., Motyka, V., Todorova, M., Trendafilova, A., Krumova, S., Dobrev, P., Andreeva, T., Oreshkova, T., Taneva, S., & Evstatieva, L. 2018. Effect of Cytokinin and Auxin Treatments on Morphogenesis, Terpenoid Biosynthesis, Photosystem Structural Organization, and Endogenous Isoprenoid Cytokinin Profile in *Artemisia alba* Turra In Vitro. *J.Plant Growth Regul.* 37 : 403 - 418
- de Matos, C. K., Pereira, C. E. L., Balena, L., & Kawakami, J. 2020. Effect of Agar Concentration in Culture Medium on In vitro Development of Potato Plant. *Research, Society and Development.* 9, (7) : 1-12.
- Delbarre, A., Muller, P., Imhoff, V., & Guern, J. 1996. Comparison of mechanisms controlling uptake and accumulation of 2,4-dichlorophenoxy acetic acid, naphthalene-1-acetic acid, and indole-3-acetic acid in suspension-cultured tobacco cells. *Planta.* 198 : 532-541
- Delbarre, A., Muller, P., Imhoff, V., Morgat, J.L., & Barbier-Brygoo, H. 1994. Uptake, accumulation and metabolism of auxins in tobacco leaf protoplasts. *Planta.* 195 : 159-167.
- Demartini, D. R. 2013. *A Short Overview of the Components in Mass Spectrometry Instrumentation for Proteomics Analyses, Tandem Mass Spectrometry - Molecular Characterization*, Ana Varela Coelho and Catarina de Matos Ferraz Franco, IntechOpen
- Dorman HJD, & Deans SG. 2000. Antimicrobial agents from plants: antibacterial activity of plant volatile oils. *J Appl Microbiol.* 88 : 308-16
- Efferth, T. 2019. Biotechnology Applications of Plant Callus Cultures. *Engineering.* 5 : 50-59
- Eisenreich W, Schwarz M, Cartayrade A, Arigoni D, Zenk MH, Bacher A. 1998. The deoxyxylulosephosphate pathway of terpenoid biosynthesis in plants and microorganisms. *Chemistry and Biology.* 5 : R221–R233
- Brahmkshatriya P.S. 2013. *Terpenes: Chemistry, Biological Role, and Therapeutic Applications*. In: Ramawat K., Mérillon JM. (eds) *Natural Products*. Springer, Berlin, Heidelberg
- Evans LM, Stephanie LC, Gene PS, Robert WH: Stearate preferentially induces apoptosis in human breast cancer cells. *Nutr Cancer* 61(5): 746-753, 2009.
- Evans LM, Toline EC, Desmond RA, Siegal GP, Hashim AI, Hardy RW: Dietary stearate reduces human breast cancer metastasis burden in athymic nude mice. *Clin Exp Metastasis* 26(5): 415-424, 2009.
- Faisal M., dan Anis M. 2003. Rapid Mass Propagation of *Tylophora indica* Merrill via Leaf Callus Culture. *Plant Cell, Tissue and Organ Culture.* 75 : 125-129.
- Fadhilah, Y.S. 2016. *Identifikasi golongan senyawa toksik daun gaharu Gyrinops versteegii (Gilg.) Domke dan Aquilaria malaccensis Lamk. Terhadap sel kanker payudara T47D*. Tesis. Universitas Gadjah Mada

- Falaki, F. 2019. *Sample Preparation Techniques for Gas Chromatography. In Gas Chromatography - Derivatization, Sample Preparation, Application*. Edited by Peter Kusch. IntechOpen.
- Fontana, A., Spolaore, B., & Polverino de Laureto, P. 2013. The biological activities of protein/oleic acid complexes reside in the fatty acid. *Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics*. 1834, (6) : 1125–1143.
- Ghashighaie, J., Brenckmann, F., & Saugier, B. 1991. Effect of agar concentration on the water status and growth of rose plants cultured in vitro. *Physiol. Plant*. 82 : 72-78
- Georgiev, M. I., Ivanovska, N., Alipieva, K., Drimitrova, P., & Verpoorte, R. 2013. Harpagoside : from Kalahari Desert to Pharmacy Shelf. *Phytochemistry*. 92 : 8-15
- Ghashighaie, J., Brenckmann, F., & Saugier, B. 1991. Effect of agar concentration on the water status and growth of rose plants cultured in vitro. *Physiol. Plant*. 82 : 72-78
- Ghimire, G. P., Thuan, N. H., Koirala, N., & Sohng, J. K. (2016). Advances in Biochemistry and Microbial Production of Squalene and Its Derivatives. *Journal of Microbiology and Biotechnology*. 26(3), 441–451
- Grob, K. 2003. *Split and Splitless Injection for Quantitative Gas Chromatography : Concepts, Processes, Practical Guidelines, Sources of Error. Fourth, completely revised edition*. WILEY-VCH. Germany
- Grossmann, K. 2007. Auxin Herbicide Action. *Plant Signal Behav*. 2, (5) : 2421-423
- Guo, L., Wu., J. Z. Han, T., Cao, T., Rahman, K., & Qin, L.P. 2008. Chemical composition, antifungal and antitumor properties of ether extracts of *Scapania verrucosa* Heeg. and its endophytic fungus *Chaetomium fusiforme*. *Molecules*. 13, (9) : 2114–2125
- Gyurkovska V, Alipieva K, Maciuk A, Dimitrova P, Ivanovska N, Haas C. 2011. Anti-inflammatory activity of Devil's claw in vitro systems and their active constituents. *Food Chem*. 125:171-8.
- Hao, X., Shim, M., Cui, L., Xu, C., Zhang, Y., & Kai, G. 2015. Effects of methyl jasmonate and salicylic acid on tanshinone production and biosynthetic gene expression in transgenic *Salvia miltiorrhiza* hairy roots. *Biotechnology and applied biochemistry*. 62, (1):24-31.
- Harborne JB. *Phytochemical methods. A guide to modern techniques of plant analysis*. 3rd. ed. London, UK: Thompson Science; 1998.p. 1\_317
- Hashim, Y., Ismail, N., & Abbas, P. 2014. Analysis of chemical compounds of agarwood oil from different species by gas chromatography mass spectrometry (GCMS). *IIUM Eng. J*. 15 : 55–60



- Hayashi K, Kamiya M, Hayashi T. 1995. Virucidal effects of the steam distillate from *Houttuynia cordata* and its components on HSV-1, influenza virus, and HIV. *Planta Med.* 61, (3):237-41
- Hou D. 1960. *Thymelaeaceae*. In: *Flora Malesiana Series I, Vol 6*. Editet by Van Steenis, C.G.G.J. Wolter-Noordhoff Publishing : Groningen.
- Huang M, Lu J-J, Huang M-Q, Bao J-L, Chen X-P, Wang Y-T. 2012. Terpenoids: natural products for cancer therapy. *Expert Opin Investig Drugs*. 21:1801\_18
- Ibrahim. 2010. Pengaruh Umur Eksplan Terhadap Keberhasilan Pembentukan Kalus Embriogenik pada Kultur Meristem Jahe (*Zingiber officinale*). *Jurnal Sains dan Teknologi Indonesia*. 16 (1) : 37-42.
- Ikeuchi, M., Sugimoto, K., & Akira, I. 2013. Plant Callus : Mechanisms of Induction and Represion. *The Plant Cell*. 25 : 3159-3173
- Iskandar, S., & Suhendra, A. 2012. Uji Inokulasi *Fusarium* sp Untuk Produksi Gaharu Pada Budidaya A. Beccariana. *Jurnal Sains dan Teknologi Indonesia*. 14, (3) : 182-188
- ITIS Report. 2011. *Gyrinops versteegii* (Gilg) Domke. *Resources Information Network (GRIN)*, 2007-2011, database (version 2011). Expert : Laurence. J. Dorr.
- Iwase, A., Mitsuda N., Koyama T., Hiratsu K., Kojima, M., Arai, T., Inoue, Y., Seki, M., Sakakibara, H., Sugimoto, K., & Ohme-Takagi, M. 2011. The AP2/ERF transcription factor WIND1 control cell differentiation in *Arabidopsis*. *Curr. Biol*. 21 : 508-514
- Jayaraman, S., & Mohamed, R. 2015. Crude extract of *Trichoderma* elicits agarwood substances in cell suspension culture of the tropical tree, *Aquilaria malaccensis* Lam. *Turkish Journal of Agriculture and Forestry*. 39: 163-173
- Jayaraman, S., Daud, N. H., Halis, R., & Mohamed, R. 2014. Effects of plant growth regulators, carbon sources and pH values on callus induction in *Aquilaria malaccensis* leaf explants and characteristics of the resultant calli. *Journal of Forestry Research*. 25, (3): 535–540
- Jenie, U.A., Kardono, L.B.S., Rumampuk, R.J., Darmawan, A. 2014. *Teknik Modern Spektroskopi NMR – Teori dan Aplikasi dalam Elusidasi Struktur Molekul Organik*. Lipi Press. Jakarta.
- Jiang, Z., Kempinski, C., & Chappeli, J. 2016. Extraction and Analysis of Terpenes/Terpenoids. *Curr Protoc Plant Biol*. 1: 345–358
- Jong, P. L., Pascale, T., and Rozi, M. (2014). Gas chromatography-mass spectrometry analysis of agarwood extracts from mature and juvenile *Aquilaria malaccensis*. *Int. J. Agric. Biol*. 16 : 644–648.
- Jubie, S., Ramesh, P.N., Dhanabal, P., Kalirajan, R., Muruganantham, N., & Antony, A.S. 2012. Synthesis, antidepressant and antimicrobial activities of

- some novel stearic acid analogues. *European Journal of Medicinal Chemistry*. 54 : 931-935
- Jung, S., Lee, S., Lee, H., Yoon, J., & Lee, E. K. 2016. Oleic acid-embedded nanoliposome as a selective tumoricidal agent. *Colloids and Surfaces B: Biointerfaces*. 146 : 585–589.
- Kapoor, S., Raghuvanshi, R., Bhardwaj, P., Sood, H., Saxena, S., & Chaurasia, O. P. 2018. Influence of light quality on growth, secondary metabolites production and antioxidant activity in callus culture of *Rhodiola imbricata* Edgew. *Journal of Photochemistry and Photobiology B: Biology*. 183 : 258–265.
- Kelly, G.S. 1999. Squalene and its potential clinical uses. *Alternative Medicine Review*. 44,(11) : 29–36, 1999
- Keng, C.L., Singaram, N., & Lim, B.P. 2010. Production of artemisinin from cell suspension culture of *Artemisia annua* L. *Molecular Biology and Biotechnology*. 18, (1) : 139-141.
- Kepler, R., & Kristen, U. 1986. Exogenous Cytokinins Cause Cell Separation and Cell Expansion in The Root Tip Cortex of *Zea mays*. *Botanical Gazete*. 147, (3) : 247-251
- Khan IH, Javaid A (2020). Anticancer, antimicrobial and antioxidant compounds of quinoa inflorescence. *Adv. Life Sci*. 8(1): 68-72
- Kim, O.T., Yoo, N.H., Kim, G.S., Kim, Y.C., Bang, K.H., & Hyun, D.Y. 2013. Stimulation of Rg3 ginsenoside biosynthesis in ginseng hairy roots elicited by methyl jasmonate. *Plant Cell, Tissue and Organ Culture (PCTOC)*. 112, (1) : 87-93.
- Khoerani. 2013. *Studi Pembungaan Dan Perkembangan Buah Serta Viabilitas Polen Pohon Gaharu (Gyrinops versteegii)*. SKRIPSI. Departemen Biologi, Fakultas Matematika Dan Ilmu Pengetahuan Alam. Institut Pertanian Bogor. Bogor.
- Kosmiatin, M., Husni, A., & Mariska, I. 2005. Perkecambahan dan Perbanyakan Gaharu secara In Vitro. *Jurnal AgroBiogen*. 1, (2):62-67
- Lange BM, Rujan T, Martin W, Croteau R. 2000. Isoprenoid biosynthesis: the evolution of two ancient and distinct pathways across genomes. *Proceedings of the National Academy of Sciences of USA*. 97 : 13172–13177;
- Lanzotti V. 2013. *Diterpenes for therapeutic use*. In: Ramawat KG, Merillon JM, editors. *Natural products: phytochemistry, botany and metabolism of alkaloids, phenolics and terpenes*. Springer-Verlag : Berlin Heidelberg
- Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A. 2016. *Hawley's Condensed Chemical Dictionary 16th Edition*. John Wiley & Sons, Inc. Hoboken : New Jersey



- Lesgards JF, Baldovini N, Vidal N, Pietri S. 2014. Anticancer activities of essential oils constituents and synergy with conventional therapies: a review. *Phytother Res.* 28:1423-46
- Lewis, R.J. Sr. 2007. *Hawley's Condensed Chemical Dictionary 15th Edition*. John Wiley & Sons, Inc. New York
- Li C, Zhao X, Toline EC, Siegal GP, Evans LM, Hashim AI, Desmond RA, Hardy RW: Prevention of carcinogenesis and inhibition of breast cancer tumor burden by dietary stearate. *Carcinogenesis* 32(8): 1251-1258, 2011.
- Liang, X., Huang, Y., Pan, X., Hao, Y., Chen, X., Jiang, H., Li, J., Zhou, B., & Yang, Z. 2020. Erucic acid from *Isatis indigotica* Fort. suppresses influenza A virus replication and inflammation in vitro and in vivo through modulation of NF- $\kappa$ B and p38 MAPK pathway. *J Pharm Anal.* 10, (2):130-146
- Lin, J., Wang, D., Chen, X., Köllner, T. G., Mazarei, M., Guo, H., Pantalone, V. R., Arelli, P., Stewart, C. N., Jr, Wang, N., & Chen, F. 2017. An (E,E)- $\alpha$ -farnesene synthase gene of soybean has a role in defence against nematodes and is involved in synthesizing insect-induced volatiles. *Plant biotechnology journal.* 15, (4) : 510–519
- Liu, Y., Chen, H., Yang, Y., Zhang, Z., Wei, J., Meng, H. 2013. Wholletree agarwood-inducing technique: an efficient novel technique for producing high-quality agarwood in cultivated *Aquilaria sinensis* trees. *Molecules.*18, 3086–3106
- Loyola-Vargas, V.M., & Vázquez-Flota, F. 2005. *Methods in Molecular Biology - Plant Cell Culture Protocols*. Edisi ke-2. Humana Press Inc : Totowa
- Lu, Z., Peng, B., Ebert, B. E., Dumsday, G., & Vickers, C. E. 2021. Auxin-mediated protein depletion for metabolic engineering in terpene-producing yeast. *Nature communications.* 12, (1) : 1051
- Ludwiczuk, A., Skalicka-Wozniak, K., & Georgiev, M. I. 2017. *Terpenoids*. In Badal, S., & Delgoda R (eds), *Pharmacognosy: Fundamentals, Applications and Strategies*. Academic Press is an imprint of Elsevier
- Maffei ME, Gertsch J, Appendino G. 2011. Plant volatiles: production, function and pharmacology. *Nat Prod Rep.* 28:1359\_80.
- Mahadi I., W. Syafi'i, & Y. Sari. 2016. Induksi kalus jeruk kasturi (*Citrus microcarpa*) menggunakan hormon 2,4-D dan BAP dengan metode in vitro. *JIPi.* 21 (2): 84-89.
- Mahmud, I., Thapaliya, M., Boroujerdi, A., & Chowdhury, K. 2014. NMR-based metabolomics study of the biochemical relationship between sugarcane callus tissues and their respective nutrient culture media. *Analytical and Bioanalytical Chemistry.* 406, (24) : 5997–6005.

- Malik, S., Cusidó, R. M., Mirjalili, M. H., Moyano, E., Palazón, J., & Bonfill, M. 2011. Production of the anticancer drug taxol in *Taxus baccata* suspension cultures: A review. *Process Biochemistry*, 46(1), 23–34.
- Marchant, A., Kargul, J., May, S.T., Muller, P., Delbarre, A., Perrot-Rechenmann, C., & Bennett, M.J. 1999. AUX1 regulates root gravitropism in *Arabidopsis* by facilitating auxin uptake within root apical tissues. *The EMBO Journal*. 18, 8 : 2066–207
- McGinty, D., Letizia, C.S., & Api, A.M. 2011. Fragrance material review on ethylene brassylate. *Food and Chemical Toxicology*. 49 : S174-S182
- Mellon, F. A. 2003. MASS SPECTROMETRY | Principles and Instrumentation. *Encyclopedia of Food Sciences and Nutrition*. 3739–3749.
- Mo Q., Fan. C., Zhou, G., Fu, H., & Wang, Y. 2019. Composition variation of agarwood-associated microbial communities from *Aquilaria sinensis*. *bioRxiv*. 14 : 1-28.
- Mohamed, R., Jong, P. L., & Zali, M. S. 2010. Fungal diversity in wounded stems of *Aquilaria malaccensis*. *Fungal Divers*. 43 : 67–74.
- Mohy El-Din, S. M., & Mohyeldin, M. M. 2018. Component Analysis and Antifungal Activity of the Compounds Extracted from Four Brown Seaweeds with Different Solvents at Different Seasons. *Journal of Ocean University of China*. 17, (5) : 1178–1188.
- Mulyaningsih, T., & Yamada, I. 2007. *Notes on Some Species of Agarwood in Nusa Tenggara, Celebes and West Papua, in Natural Resource Management and Socio-Economic Transformation under the Decentralization in Indonesia: Toward Sulawesi Area Studies*. Edited by Koji, T., Kosuke, M., Masaaki, O., Katsuya, O., Jun, A., & Masahiro, I. Kyoto : CSEAS Kyoto University.
- Munasinghe, S.P., Weerakoon, S. R., Somaratne, S., & Ranasinghe, C. An Efficient Callus Induction Protocol for *Gyrinops walla* Gaetner ‘Walla patta’, a commercially Important Agarwood Species in Sri Lanka. *Scholars Journal of Research in Agriculture and Biology*. 2, (2) : 96-102
- Nafisi, M., Fimognari, L., & Sakuragi, Y. 2015. Interplays between the cell wall and phytohormones in interaction between plants and necrotrophic pathogens. *Phytochemistry*. 112 : 63-71
- Nasution, A. A., Siregar, U. J., Miftahudin., & Turjaman, M. 2019. Identification of chemical compounds in agarwood-producing species *Aquilaria malaccensis* and *Gyrinops versteegii*. *J. For. Res.* 30 (119) : 1-10.
- Nazemi, M., Khoshkhoo, Z., Motalebi, A., & Karim, H. 2010. Identification non polar component and antibacterial activities of *Iophonla evistylus* from Persian Gulf. *International Journal of Environmental Science and Development*. 6, (2) : 92–197

- Nguyen, H. T. M. ., A. K. Neelakadan, T. N. Quach. 2013. Molecular characterization of Glycine max squalene synthase genes in seed phytosterol biosynthesis. *Plant Physiology and Biochemistry*. 73 : 23–32, 2013.
- Nuringtyas, T. R., Isromarina, R., Septia, Y., Hidayati, L., Wijayanti, N., & Moeljopawiro, S. 2018. The Antioxidant and Cytotoxic Activities of the Chloroform Extract of Agarwood (*Gyrinops versteegii* (Gilg.) Domke) Leaves on HeLa Cell Lines. *AIP Conf. Proc.* 2002 : 020067-1 – 020067-9
- Ogita S. 2015. Plant cell, tissue and organ culture: the most flexible foundations for plant metabolic engineering applications. *Nat Prod Commun.* 10, (5):815-20. PMID: 26058164.
- Okudera, Y., & Ito, M. 2009. Production of agarwood fragrant constituents in *Aquilaria calli* and cell suspension cultures. *Plant Biotechnology*. 26 : 307–315
- Olgunsoy, P., Ulusoy, S., Akçay, U.C. 2017. Metabolite Production and Antibacterial Activities of Callus Cultures from *Rosa damascena* Mill. Petals. *Marmara Pharmaceutical Journal*. 21, (3) : 590-597
- O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006
- Paduch R, Trytek M, Król SK, Kud J, Frant M, Kandefer-Szerszeń M, Fiedurek J. 2016. Biological activity of terpene compounds produced by biotechnological methods. *Pharm Biol.* 54, (6):1096-107
- Palaniyandi, T., Sivaji, A., Thiruganasambandam, R., Natarajan, S., & Hari, R.. 2018. In vitro antigastric cancer activity of squalene, a triterpenoid compound isolated from *Rhizophora Mucronata* mangrove plant leaves against AGS cell line. *Pharmacognocny magazine*. 14, (57) : 369-376
- Pamungkas, D., Inangsih, F.P., & Sumardi. 2008. Variasi Pertumbuhan Tanaman Penghasil Gaharu (*Gyrinops versteegii* (Gilg.) Domke) Umur 6 Bulan Di Stasiun Penelitian Bu'at Soe NTT. *Prosiding Diskusi Ilmiah*. 8, (4) : 349-461.
- Papon, N., Bremer, J., Vansiri, A., Andreu, F., Rideau, M., & Crèche, J. 2005. Cytokinin and ethylene control indole alkaloid production at the level of the MEP/terpenoid pathway in *Catharanthus roseus* suspension cells. *Planta Med.* 71, (6):572-4.
- Passarini, M.R.Z., e Silva, T., Bernal, S.P.F., Cecchet, N.L., Sartoratto, A., Boroski, M., Duarte, A.W.F., Ottoni, J.R., Rosa, L.H., & Oliveira, V.M. 2020. Undecane production by cold-adapted bacteria from Antarctica. *Extremophiles*. 24 : 863–873.
- Pattanaik, B., & Lindberg, P. 2015. Terpenoids and their biosynthesis in cyanobacteria. *Life*. 5:269–293

- Petrášek, J., & Friml, J. 2009. Auxin transport routes in plant development. *Development*. 136 : 2675-2688
- Xu, R., Fazio, G.C., & Matsuda, S.P.T. 2004. On the origins of triterpenoid skeletal diversity. *Phytochemistry*. 65, (3) : 261–291
- Rabi T, Bishayee A. 2009. Terpenoids and breast cancer chemoprevention. *Breast Cancer Res Treat*. 115: 223-239
- Rahayu, B., Solichatun, S., & Anggarwulan, E. (2003). Pengaruh asam 2,4-Dichlorophenoxyiacetic acid (2,4-D) terhadap pembentukan dan pertumbuhan kalus serta kandungan flavonoid kultur kalus *Acalypha indica* L. *Biofarmasi Journal of Natural Product Biochemistry*. 1(1), 1-6.
- Rasool, S., & Mohamed, R. 2016. *Understanding agarwood formation and its challenges*. In *Agarwood: Science Behind the Fragrance*. Edited by Mohamed, R. Springer : Berlin
- Rasud, Y., & Bustaman. 2020. Induksi Kalus secara In vitro dari Daun Cengkeh (*Syzygium aromaticum* L.) dalam Media dengan Berbagai Konsentrasi Auksin. *Jurnal Ilmu Pertanian Indonesia*. 25, (1) : 67-72
- Raut JS, Karuppayil SM. 2014. A status review on the medicinal properties of essential oils. *Ind Crops Prod*. 62:250-64
- Razavizadeh, R., Adabavazeh, F., and Komatsu, S. (2020). Chitosan effects on the elevation of essential oils and antioxidant activity of *Carum copticum* L. seedlings and callus cultures under in vitro salt stress. *J. Plant Biochem. Biotechnol*. 29, 473–483
- Reddy, L. H., & Couvreur, P. 2009. Squalene: a natural triterpene for use in disease management and therapy. *Advanced Drug Delivery Reviews*. 61, (15) : 1412–1426.
- Relas, H., Gylling, H., & Miettinen, T. 2001. Fate of intravenously administered squalene and plant sterols in human subjects. *Journal of Lipid Research*. 42, (6) : 988–994
- RESTEK. 2002. *Operating Hints for Using Split/Splitless Injectors*. Technical Guide. Restek Corporation
- Romanov, G.A. 2009. How do cytokinins affects the cell?. *Russian Journal of Plant Physiology*. 56, (2) : 268–290
- Rosjadi, H. S. 2011. *Induksi Kalus Tanaman Gaharu (*Gyrinops versteegii*) menggunakan 2,4-D (2,4-Dichlorophenoxyacetid acid)*. SKRIPSI. Universitas Jember
- Rosu T, Pahontu E, Pasculescu S, Georgescu R, Stanica N, Curaj A, Popescu A, Leabu M. 2010. Synthesis, characterization antibacterial and antiproliferative activity of novel Cu(II) and Pd(II) complexes with 2-hydroxy-8-R-

- tricyclo[7.3.1.0.(2,7)]tridecane-13-one thiosemicarbazone. *Eur J Med Chem.* 45,(4):1627-34.
- Russo, A., & Borrelli, F. 2005. *Bacopa monniera*, a reputed nootropic plant: an overview. *Phytomedicine.* 12, (4):305-317
- Saad, A. I., & Elshahed, A. M. 2012. *Plant Tissue Culture Media, Recent Advances in Plant in vitro Culture.* Leva, A., & Rinaldi, L.M.R (ed.). IntechOpen
- Saikia, M., Shrivastava, K., & Singh, S. S. 2012. An Efficient Protocol for Callus Induction in *Aquilaria malaccensis* Lam. Using Leaf Explants at Varied Concentrations of Sucrose. *International Journal of Plant Research.* 6, (2) : 188-194
- Saikia, M., Shrivastava, K., Singh, S. S. 2014. Effect of Culture Media and Growth Hormones on Callus Induction in *Aquilaria malaccensis* Lam., a Medically and Commercially Important Tree Species of North East India. *Asian Journal of Biological Sciences.* 6, (2) : 96-105.
- Saint-Leger, D., Bague, A., Cohen, E., & Chivot, M. 1986. A possible role for squalene in the pathogenesis of acne. I. In vitro study of squalene oxidation. *Br J Dermatol.* 114, (5) : 535-42.
- Sales-Campos H, Souza PR, Peghini BC, da Silva JS, Cardoso CR. 2013. An overview of the modulatory effects of oleic acid in health and disease. *Mini Rev Med Chem.* 13, (2):201-10
- Sari, R. A., Herawaty, R., & Herison, C. 2019. Induction and Growth of Endosperm Callus of Rimau Gerga Lebong (RGL) Citrus on Several Media Composition. 22 (2) : 56-62
- Sari, Y.P., Kusumawati, E., Saleh, C., Kustiawan, W., & Sukartingsih. 2018. Effect of sucrose and plant growth regulators on callogenesis and preliminary secondary metabolic of different explant *Myrmecodia tuberosa*. *Nusantara Bioscience.* 10, (3) : 183-192
- Sarikurkcü C, Sabih Ozer M, Cakir A, Eskici M, Mete E. 2013. GC/ MS evaluation and in vitro antioxidant activity of essential oil and solvent extracts of an endemic plant used as folk remedy in Turkey: *Phlomis bourgaei* Boiss. *Evid Based Complement Alternat Med.* 293080.
- Sarmadi, M., Karimi, N., Palazón, J., Ghassempour, A., & Hossein, M. 2019. Improved effects of polyethylene glycol on the growth, antioxidative enzymes activity and taxanes production in a *Taxus baccata* L. callus culture. *Plant Cell, Tissue Organ Cult.* vol. 0, no. 0, p. 0
- Schaller, H. 2003. The role of sterols in plant growth and development. *Progress in Lipid Research.* 42, (3) : 163–175,.
- Schun Y, & Cordell GA. 1985. Studies in the Thymelaeaceae III. Constituents of *Gyrinops walla*. *J Nat Prod.* 48, (4): 684–685.

- Scott, R. P. W. 2005. *ESSENTIAL OILS. Encyclopedia of Analytical Science 2<sup>nd</sup> edition*. Editor(s): Worsfold, P., Townshend, A., & Poole, C. Elsevier. UK
- Sen, S., Dehingia, M., Talukdar, N.C., & Khan, M. 2017. Chemometric analysis reveals links in the formation of fragrant bio-molecules during agarwood (*Aquilaria malaccensis*) and fungal interactions. *Sci Rep.* 7 : 44406.
- Setyowati, F. M. & Wardah. 2007. Keanekaragaman Tumbuhan Obat Masyarakat Talang Mamak di Sekitar Taman Nasional Bukit Tigapuluh, Riau. *Biodiversitas.* 8 (3): 228 - 232
- Shah BA, Qazi GN, Taneja SC. 2009. Boswellic acids: a group of medicinally important compounds. *Nat Prod Rep.* 26:72-89
- Shen, C., Huang, XY., Geng, CA., Li, T., Tang, S., Su, L., Gao, Z., Zhang, X., Hu, J., & Chen, J. 2020. Artemlavanins A and B from *Artemisia lavandulaefolia* and Their Cytotoxicity Against Hepatic Stellate Cell Line LX2. *Nat. Prod. Bioprospect.* 10, 243–250.
- Shin, J., & Seo, P. J. 2018. Varying Auxin Levels Induce Distinct Pluripotent States in Callus Cell. *Frontiers in Plant Science.* 9, (1653) : 1-4
- Shrilaxmi, B., Gavishsidappa, A., Hadimani, M., Biradar, S., & Das, K.K. 2018. Introductory Chapter: Primary Concept of Hypoxia and Anoxia. In Das, K.K., & Biradar, M. S (eds), *Hipoxia and Anoxia*. IntechOpen : London.
- Singh, A., & Dwivedi, P. 2018. Methyl-jasmonate and salicylic acid as potent elicitors for secondary metabolite production in medicinal plants: A review. *Journal of Pharmacognosy and Phytochemistry.* 7, (1) : 750-757
- Singh, B., & Sharma, R. A. (2015). Plant terpenes: defense responses, phylogenetic analysis, regulation and clinical applications. *Biotech.* 5(2), 129–151.
- Siran, S. A., & Turjaman, M. 2010. *Pengembangan Teknologi Produksi Gaharu Berbasis Pemberdayaan Masyarakat*. Pusat Penelitian dan Pengembangan Hutan dan Konservasi Alam. Bogor.
- Sitepu, I. R, Santoso, E., & Turjaman M. 2011. *Fragrant wood gaharu: when the wild can no longer provide*. ITTO and FORDA : Bogor
- Smith, T. J. 2000. Squalene: potential chemopreventive agent. *Expert Opinion on Investigational Drugs.* 9, (8) : 1841–1848.
- Smith, M.A.L., & Spomer, L.A. 1995. Vessels, gels, liquid media, and support systems In: *Automation and Environmental Control in Plant Tissue Culture*. Aitken-Christie, J., Kozai, T., & Smith, M.L. (ed.). Kluwer Academic Publishers. Dordrecht
- Sneddon, J., Masuram, S., & Richert, J. C. 2007. Gas Chromatography-Mass Spectrometry-Basic Principles, Instrumentation and Selected Applications for Detection of Organic Compounds. *Analytical Letters.* 40, (6) : 1003–1012.



- Snelder, D. J. & R. D. Lasco. 2008. *Smallholder Tree Growing in South and Southeast Asia. In Small holder Tree Growing for Rural Development and Environmental Services: Lessons from Asia volume 5*. Edited by Snelder, D. J. & R. D. Lasco. Springer Netherlands
- Song, Y. 2014. Insight into the mode of action of 2,4-dichlorophenoxy acetic acid (2,4-D) as an herbicide. *Joirnal of Inetgarive Plant Biology*. 56, (2) : 106-113
- Spanova, M., D. Zweytick, K. Lohner. 2012. Influence of squalene on lipid particle/droplet and membrane organization in the yeast *Saccharomyces cerevisiae*. *Biochimica et Biophysica Acta*. 1821,(4) : 647–653
- Sparkman, O. D., Penton, Z. E., & Kitson, F. G. 2011. Gas Chromatography and Mass Spectrometry: A Practical Guide. *Introduction and History* : 2–13.
- Stashenko, E., & Martínez, J. R. 2014. *Gas Chromatography-Mass Spectrometry. In Advances in Gas Chromatography*. Edited by Guo, X. IntechOpen.
- Sudha, S., Karthic, R., & Rengaramanujam, J. 2011. Anti hyperlipidemic activity of *Spirulina platensis* in Triton x100 induced hyperlipidemic rats. *Hygeia Journals for Drugs and Medicine* 3, (2) : 32-37
- Sultana N, Ata A. 2008. Oleanolic acid and related derivatives as medicinally important compounds. *J Enzyme Inhib Med Chem*. 23: 739-756
- Sumarna, Y. 2012. *Budidaya pohon penghasil gaharu*. Bogor: Pusat Litbang Produktivitas Hutan
- Susilo A, Kalima T, & Santoso E. 2014. *Panduan Lapangan Pengenalan Jenis Pohon Penghasil Agarwood *Gyrinops* spp. di Indonesia*. Editor : Susilo A, Kalima T, & Santoso E. Indonesia: Pusat Penelitian dan Pengembangan Konservasi dan Rehabilitasi International Tropical Timber Organization (ITTO) - CITES Phase II Project.
- Suttinun O, Lederman PB, Luepromachai E (2004). Application of terpene-induced cell for enhancing biodegradation of TCE contaminated soil. Songklanakarin. *J. Sci. Technol*. 26: 131-142.
- Tan, C. S., Isa, N .M., Ismail, I., & Zainal, Z. 2019. Agarwood Induction: Current Developments and Future Perspectives. *Development of Agarwood Induction Technologies*. 10 (122) : 1-13
- Tan, D. C., Kassim, N. K., Ismail, I. S., Hamid, M., & Ahamad Bustamam, M. S. 2019. Identification of Antidiabetic Metabolites from *Paederia foetida* L. Twigs by Gas Chromatography-Mass Spectrometry-Based Metabolomics and Molecular Docking Study. *BioMed research international*.7603125.
- Tao, N., Jia, L., Zhou, H., & He, X. 2014. Effect of octanal on the mycelial growth of *Penicillium italicum* and *P. digitatum* . *World J Microbiol Biotechnol*. 30 : 1169–1175

- Tasin, M., Bäckman, A.-C., Bengtsson, M., Ioriatti, C., & Witzgall, P. 2006. Essential host plant cues in the grapevine moth. *Naturwissenschaften*, 93, (3):141–144.
- Tholl D. 2015. *Biosynthesis and Biological Functions of Terpenoids in Plants*. In: Schrader J., Bohlmann J. (eds) *Biotechnology of Isoprenoids*. Advances in Biochemical
- Tholl D. Terpene synthases and the regulation, diversity and biological roles of terpene metabolism. *Current Opinion in Plant Biology* 2006;9:297–304.
- Trimulyaningsih. 2014. *Ekologi agarwood *Gyrinops versteegii* (Gilg.) Domke di hutan Lombok Barat*. DISSERTATION. Universitas Gadjah Mada : Yogyakarta
- Turjaman, M., & Hidayat, A. 2017. Agarwood-Planted Tree Inventory in Indonesia. *IOP Conf. Ser.: Earth and Environ. Sci.* 54, (1) : 012062
- Van Thanh, L., Van Do, T., Son, N. H., Sato, T., and Kozan, O. 2015. Impacts of biological, chemical and mechanical treatments on sesquiterpene content in stems of planted *Aquilaria crassna* trees. *Agroforest. Syst.* 89 : 973–981
- Wagner, K. H., & Elmadfa, I. 2003. Biological relevance of terpenoids. Overview focusing on mono-, di- and tetraterpenes. *Ann Nutr Metab.* 47, (3-4) :95-106.
- Wang, Q., Liu, H., Zhang, M., Liu, S., Hao, Y., & Zhang, Y. 2020. MdMYC2 and MdERF3 Positively Co-Regulate  $\alpha$ -Farnesene Biosynthesis in Apple. *Frontiers in Plant Science.* 11, (512844) : 1-10
- Wang A, Ma C, Chai Y, Liu X, Lv K, Fu L, Wang B, Jia X, Liu M, Lu Y. 2020. Identification of benzothiazinones containing 2-benzyl-2,7-diazaspiro[3.5]nonane moieties as new antitubercular agents. *Eur J Med Chem.* 200 :112409
- Wang G, Tang W, Bidigare RR. 2005. *Terpenoids as therapeutic drugs and pharmaceutical agents. Natural products: Drug discovery and therapeutic medicine*. In: Zhang L, Demain AL (Eds.). Humana Press. Totowa, NJ
- Wang, M. R., Li, W., Luo, S., Zhao, X., Ma, C. H., & Liu, S. X. (2018). GC-MS Study of the Chemical Components of Different *Aquilaria sinensis* (Lour.) Gilgorgans and Agarwood from Different Asian Countries. *Molecules (Basel, Switzerland)*. 23(9), 2168.
- Wang, S., Yu, Z., Wang, C., Wu, C., Guo, P., & Wei. 2018. Identification of chemical compounds in agarwood-producing species *Aquilaria malaccensis* and *Gyrinops versteegii*. *Molecules*. 23, (342) : 1-21
- Wardana, T. A. P., Nuringtyas, T. R., Wijayanti, N., & Hidayati, L. 2019. Phytochemical Analysis of Agarwood (*Gyrinops versteegii* (Gilg.) Domke) Leaves Extracts as Anticancer using GC-MS. *AIP Conf. Proc.* 2194, 020136-1–020136-9

- Wu CF, Karioti A, Rohr D, Bilia AR, Efferth T. Production of rosmarinic acid and salvianolic acid B from callus culture of *Salvia miltiorrhiza* with cytotoxicity towards acute lymphoblastic leukemia cells. *Food Chem.* 201:292-7.
- Wu, Z. Q., Liu, S., Li, J. F., Li, M. C., Du, H. F., Qi, L. K. 2017. Analysis of gene expression and quality of agarwood using Agar-bit in *Aquilaria sinensis*. *J. Trop. For. Sci.* 29 : 380–388
- Xiangwei, Z., Xiaodong, W., Peng, N. 2006. Chemical composition and antimicrobial activity of the essential oil of *Sagittaria trifolia* . *Chem Nat Compd.* 42 : 520–522
- Xu J., Ge X., Dolan M.C. 2011. Towards high-yield production of pharmaceutical proteins with plant cell suspension cultures. *Biotechnol. Adv.* 2011;29:278–299
- Xu, W., Ma, X., & Wang, Y. Production of squalene by microbes: an update. *World Journal of Microbiology and Biotechnology.* 32, (12) : 195.
- Yang, L., Wen, K.S., Ruan, X., Zhao, X. Y., Wei, F., & Wang, Q. Response of plant secondary metabolites to environmental factors. *Molecules.* 23, (4) : 762
- Zakaria, F., Talip, B.A., Kahar, E.E.M., & Basri, H. 2020. Solvent used in extraction process of agarwood: a systematic review. *Food research.* 4, (3) : 731-737
- Zhang, X. L., Liu, Y. Y., Wei, J. H., Yang, Y., Zhang, Z., Huang, J. Q., *et al.* (2012). Production of high-quality agarwood in *Aquilaria sinensis* trees via whole-tree agarwood-induction technology. *Chin. Chem. Lett.* 23 : 727–730.
- Zhao, J., Zhu, W., Hu, Q., & Qing, Y. 2001. Compact Callus Cluster Suspension Cultures of *Catharanthus roseus* with Enhanced Indole Alkaloid Biosynthes. *In vitro Cell. Dev. Biol.Plant.* 37 : 68-72
- Zhou, P., Yang, J., Zhu, J., He, S., Zhang, W., & Yu, W. 2015. Effects of  $\beta$ cyclodextrin and methyl jasmonate on the production of vindoline, catharanthine, and ajmalicine in *Catharanthus roseus* cambial meristematic cell cultures. *Applied Microbiology and Biotechnology.* 99, (17):7035-7045.
- Zhou, Y., Liao, Q., Lin, M., Deng, X., Zhang, P., Yao, M., Zhang, L., & Xie, Z. 2014. Combination of 1H NMR- and GC-MS-Based Metabonomics to Study on the Toxicity of *Coptidis Rhizome* in Rats. *PLOS ONE.* 9, (2): e88281
- Zia, K., Siddiqui, T., Ali, S., Farooq, I., Zafar, M. S., & Khurshid, Z. 2019. Nuclear Magnetic Resonance Spectroscopy for Medical and Dental Applications: A Comprehensive Review. *European Journal of Dentistry.* 13, (01) : 124–128
- Zia, M., Rehman, R., & Chaudhary, M.F. 2007. Hormonal regulation for callogenesis and organogenesis of *Artemisia absinthium* L. *African Journal of Biotechnology.* 6, (16) : 1874-1878.



- Zimmerman, J.L. (1993). Somatic embryogenesis: A model for early development in higher plants. *Plant Cell*. 5: 1411–1423
- Zubaidi, A & N. Farida. 2008. Pertumbuhan bibit gaharu pada beberapa jenis naungan. *CropAgro*. 1, (2) : 92 – 96.