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DAFTAR PUSTAKA

Additives, E. P. F. 2010. Scientific Opinion on the safety of glycerol esters of gum rosin for the proposed uses as a food additive EFSA Panel on Food Additives and Nutrient Sources added to Food (ANS). EFSA Journal, 8(7):1-31.

Affandi, O., Zaitunah, A., and Batubara, R. 2017. Potential economic and development prospects of non timber forest products in community agroforestry land around Sibolangit Tourism Park. Forest and Society, 1(1): 68-77.

Antolovich, M., Prenzler, P. D., Patsalides, E., McDonald, S., and Robards, K. 2002. Methods for testing antioxidant activity. Analyst, 127(1):183-198.

Appanah, S., and Turnbull, J. M. 1998. A review of *dipterocarps*: taxonomy, ecology, and silviculture. Center for International Forestry Research. Bogor, Indonesia.

Arisandi, R., Jihad, A. N., Paleva, A. H. S., Kurniawan, F. A., Lukmandaru, G., Kartikawati, N. K., Rimbawanto, A., Sunarti, S., Herawan, T., Haryjanto, L., Putri, A. I., Lestari, F., and Nirsatmanto, A. 2024. Characterization of extractive composition in the wood and bark of cajuputi (*Melaleuca cajuputi subsp. Cajuputi powell*.) grown in Gunungkidul, Indonesia. Wood Research, 69(1):103–119.

Arisandi, R., Marsoem, S. N., Lukmandaru, G., Ashitani, T., and Takahashi, K. 2019. The contents of phenolics and cell wall component of *Eucalyptus pellita* F. Muell stemwood and bark. Wood Research, 64(3):411-422.

Aslam, M. S., Ahmad, M. S., and Mamat, A. S. 2015. A phytochemical, ethnomedicinal and pharmacological review of genus *Dipterocarpus*. International Journal of Pharmacy and Pharmaceutical Sciences, 7(4):27-38.

UNIVERSITAS GADJAH MADA
KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Atmoko, T., Arifin, Z., and Priyono, P. 2016. Struktur dan sebaran tegakan *Dipterocarpaceae* di sumber benih Merapit, Kalimantan Tengah. Jurnal Penelitian Sosial dan Ekonomi Kehutanan, 8(4):399-413.

Back, E. L. 2002. Pattern of parenchyma and canal resin composition in softwoods and hardwoods. Journal of Wood Science, 48(3):167-170.

Barry, T. H. 1937. Resinous Plant Products. Science Progress. JSTOR, 31(123): 49-461.

Bratastuti, F. N., Suharti, P. H., and Ramadhana, R. 2024. Kajian literatur peningkatan kualitas gondorukem termodifikasi. Distilat: Jurnal Teknologi Separasi, 10(2):357–369.

Brophy, J. J., Goldsack, R. J., Wu, M. Z., Fookes, C. J., and Forster, P.I.. 2000. The steam volatile oil of Wollemianobilis and its comparison with other members of the *Araucariaceae* (*Agathis and Araucaria*). Biochemical Systematics Ecology, 28(6):563–578.

Bucci, S. J., Silletta, L. C., Cavallaro, A., Arias, N. S., Campanello, P., Goldstein, G., and Scholz, F. G. 2021. Stored water in the inner bark and sapwood: Atypical patterns of daily discharge and recharge, radial osmotic gradient and freezing resistance. Authorea 1-26. https://doi.org/10.22541/au.162259432.26688664/v1

Butler, D. 2010. How to plant a tree: a simple celebration of trees and tree-planting ceremonies. Penguin Group (USA) Inc. NewYork.

Cown, D. J., Donaldson, L. A., and Downes, G. M. 2011. A review of resin features in radiata pine. New Zealand Journal of Forestry Science, 41:41-60.

De Medina, V. S., Priego-Capote, F., and Luque De Castro, M. D. 2013. Comparison of saponification methods for characterization of the nonsaponifiable fraction of virgin olive oil. European Journal of Lipid Science and Technology, 115(11):1325–1333.

Del Río, J. C., Marques, G., Rodríguez, I. M., and Gutiérrez, A. 2009. Chemical composition of lipophilic extractives from jute (*Corchorus capsularis*)

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

fibers used for manufacturing of high-quality paper pulps. Industrial Crops and Products, 30(2):241–249.

Dieters, M. J., Nikles, D. G., and Keys, M. G. 2007. Achievements in forest tree improvement in Australia and New Zealand 6: Genetic improvement and conservation of *A. cunninghamii* in Queensland. Australian Forestry, 70(2):75-85.

Divvela, H. N. D., Duppala, L., and Kolapalli, V. R. M. 2016. Isolation and acute oral toxicity studies of *Araucaria heterophylla* novel natural polysaccharide gum in albino mice. World Journal of Pharmacy and Pharmaceutical Sciences, 5(10):702-711.

Eksi, G., Kurbanoglu, S., and Erdem, S. A., 2020. Recent advances in natural products analysis. Analysis of diterpenes and diterpens. Recent Advances in Natural Product Analysis. Elsevier: 313–345.

Fernandes, A., and Maharani, R. 2019. Phytochemical and GC-MS analysis of oleoresin of *Dipterocarpus gracilis Blume*: As a basic consideration for human remedy. International Journal of Pharmaceutical Sciences and Research, 10(5):2224-2229.

Fernandes, A., and Maharani, R. 2022. The potential of production and characteristic of oleoresin tapped from *D. verrucosus* as natural ingredient for multi purposes. In : 7th International Conference on Biological Science (ICBS 2021). Atlantis Press, 22:59-65.

Franich RA, McDonald AG, and Steward D. 1999. Essential oil of the wood of *A. cunninghamii* Aiton ex D. Don. Journal Essential Oil Research, 11:38–40.

Gallo, M. 2022. Extraction and isolation of natural products. Separations, 9(10):287.

Gianno, R. 1986. The exploitation of resinous products in a lowland Malayan Forest.Wallaceana, 43:3-6.

Goh, K., K., Sukiran., Normah., and Baharum. 2016. Metabolite profiling reveals temperature effects on the vocs and flavonoids of different plant populations. Plant Biology,18:130–39.

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
Aishah Agustian, Prof. Dr. Ir. Ganis Lukmandaru, S.Hut., M.Agr., IPU ;Dr. Ir. Rizki Arisandi, S.Hut
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Grabmann, J. 2005. Terpenoid as plant antioxidants. Vitamins and Hormones, 72:505–535.

Gutiérrez, A., Del Río, J. C., González-Vila, F. J., and Martín, F. 1998. Analysis of lipophilic extractives from wood and pitch deposits by solid-phase extraction and gas chromatography. Journal of Chromatography A, 823(1–2):449–455.

Hacini, Z., Khedja, F., Habib, I., Kendour, Z., and Debba, Z. 2018. Evaluation of antibacterial and antioxidant activities of three types of benzoin resin. European Journal of Chemistry, 9(4):408-411.

Hadiyan, Y. 2015. Pentingnya *integrated approach* dalam konservasi keragaman jenis dan sumberdaya genetik damar mata kucing di Kabupaten Pesisir Barat, Lampung. In: Prosiding Seminar Nasional Masyarakat Biodiversity Indonesia, 1(4):702-706.

Hady, H., El-Wakil, E. A., and Morsi, E. A. 2019. Characterization of ethyl acetate and methanol extracts of *Commiphora myrrha* and evaluating in vitro anti-diabetic and anti-obesity activities. Journal of Applied Pharmaceutical Science, 9(9):38-44.

Hamdani, A. M., Wani, I. A., and Bhat, N. A. 2019. Sources, structure, properties and health benefits of plant gums: A review. International Journal of Biological Macromolecules, 135(2019):46-61.

Hamid, A. A., Aiyelaagbe, O. O., Usman, L. A., Ameen, O. M., and Lawal, A. 2010. Antioxidants: Its medicinal and pharmacological applications. African Journal of Pure and Applied Chemistry, 4(8):142-151.

Hanna, V. S., and Hafez, E. A. A. 2018. Synopsis of arachidonic acid metabolism: A review. Journal of Advanced Research, 11:23-32.

Heftmann, E. 1975. Functions of steroids in plants. Phytochemistry, 14(4):891-901.

Houck, J. E., and Eagle, B. N. 1998. Hardwood or softwood? Science and Technology, 32:13-22.

Jantan, I. B., 1988. The essential oil of *Dipterocarpus kerr*. Journal of Tropical Science, 1(1):11-15.

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Aishah Agustian, Prof. Dr. Ir. Ganis Lukmandaru, S.Hut., M.Agr., IPU ;Dr. Ir. Rizki Arisandi, S.Hut
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Idham, M., dan Muin, S. 2013. Penyadapan getah keruing (*Dipterocarpus* spp) di Hutan Desa Dusun Benua Kecamatan Sungai Ambawang Kabupaten Kubu Raya berdasarkan diameter pohon. Tengkawang: Jurnal Ilmu Kehutanan, 3(1):46-51.

Thomas, P. 2011. *Araucaria cunninghamii*. The IUCN Red List of Threatened Species 2011: International Union for Conservation of Nature and Natural Resources, 1-8.

Barstow, M. 2018. *Dipterocarpus verrucosus*. The IUCN Red List of Threatened Species, International Union for Conservation of Nature and Natural Resources, 1-8.

Izydorczyk, M., Cui, S. W., and Wang, Q. 2005. Polysaccharide gums: structures, functional properties, and applications. In: Food carbohydrates: Chemistry, physical properties, and applications, Chapter 6:293-299.

Jansson, M. B., and Nilvebrant, N. O. 2009. Wood extractives. Pulp and paper chemistry and Technology, (1):147-171. De Gruyter. Berlin, New York.

Kabir, A., Cacciagrano, F., Tartaglia, A., Lipsi, M., Ulusoy, H. I., and Locatelli, M. 2020. Analysis of monoterpenes and monoterpens. Recent Advances in Natural Products Analysis, Elsevier 7:275–286.

Kallio, T., Alajoki, S., Pore, V., Ritala, M., Laine, J., Leskelä, M., and Stenius, P. 2006. Antifouling properties of TiO2: Photocatalytic decomposition and adhesion of fatty and rosin acids, sterols and lipophilic wood extractives. Colloids and Surfaces A: Physicochemical and Engineering Aspects, 291(1-3):162-176.

Keeren S. R., Arifin A., Singh D. K., Abdul H., Shamshuddin J., and Zhen W. 2013. Heavy metal uptake and translocation by *D. verrucosus* from sewage sludge contaminated soil.American Journal of Environmental Sciences, 9(3):259-268.

Khiev, P Kwon, O.K Song, H.H Oh, S.R, Ahn, K.S, Lee, H.K, Chin, Y.W. 2012. Cytotoxic terpenes from the stems of *Dipterocarpus obtusifolius* collected in Cambodia. Chemical and Pharmaceutical, 60(8):955–961.

UNIVERSITAS GADJAH MADA
KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Koleva, I. I., Van Beek, T. A., Linssen, J. P. H., Groot, A. D., and Evstatieva, L. N. 2002. Screening of plant extracts for antioxidant activity: A comparative study on three testing methods. Phytochemical Analysis, 13(1):8–17.

Kumar, A., Singh, S., Singh, M. K., Gupta, A., Tandon, S., and Verma, R. S. 2022. Chemistry, biological activities, and uses of *Araucaria* resin. In: Gums, Resins and Latexes of Plant Origin: Chemistry, Biological Activities and Uses. Springer International Publishing, 1-16. Ghaziabad, India.

Kurniawanti, D. D. A., Dianhar, H., Rahayu, D. U. C., and Sugita, P. 2021. Phytochemical screening and preliminary evaluation of antioxidant activity of three Indonesian *araucaria* leaves extracts. Science Archives, 2(3):250-254.

Lattanzio, V. 2013. Phenolic compounds. Natural Products, Springer, 1543-1580. Foggia, Italy https://doi.org/10.1007/978-3-642-22144-6_57.

Lempang, M. 2017. Sifat dasar dan kegunaan kayu Agathis (*Agathis hamii* M. Dr.) dari Sulawesi Selatan. Jurnal Penelitian Kehutanan Wallacea, 6(2):57-167.

Lewinsohn, E., Savage, T. J., Gijzen, M., and Croteau, R. 1993. Simultaneous analysis of monoterpenes and diterpens of conifer oleoresin. Phytochemical Analysis, 4(5):220–225.

Longsri, B., Kanpipit, N., Puthongking, P., Mahakunakorn, P., Tiyaworanant, S., Sungthong, B., and Thapphasaraphong, S. 2021. Determination of a chemical marker in *Dipterocarpus alatus* oleoresin samples and bioactivity screening via antioxidants, nitric oxide inhibition on Murine RAW 264.7 cells, and collagen production on normal human dermal fibroblasts. Tropical Journal of Natural Product Research, 5(5):850-856.

Ludwiczuk, A., Skalicka-Woźniak, K., and Georgiev, M. I. 2017. Terpenoids. In: Pharmacognos Academic Press Chapters 11: 233-266. Plovdiv, Bulgaria.

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
Aishah Agustian, Prof. Dr. Ir. Ganis Lukmandaru, S.Hut., M.Agr., IPU ;Dr. Ir. Rizki Arisandi, S.Hut
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Lukmandaru, G. 2012. Komposisi ekstraktif pada kayu mangium (*Acacia mangium*). Jurnal Ilmu dan Teknologi Kayu Tropis, 10(2):150-158.

Lukmandaru, G. 2014. Fraksinasi kopal dengan berbagai pelarut organik. In: Prosiding Seminar Nasional "Peranan dan Strategi Kebijakan Pemanfaatan Hasil Hutan Bukan Kayu (HHBK) dalam Meningkatkan Daya Guna Kawasan (Hutan). 382-386.

Lukmandaru, G. 2017. Komponen kimia dan sifat antioksidan kopal. Jurnal Ilmu dan Teknologi Kayu Tropis, 15(1):38-47.

Mahmoudi, M., Ebrahimzadeh, M. A., Nabavi, S. F., Hafezi, S., Nabavi, S. M., and Eslami, S. H. 2010. Antiinflammatory and antioxidant activities of gum mastic. European Review for Medical and Pharmacological Sciences, 14(9):765-769.

Marsusi, M., Mukti, C., Setiawan, Y., Kholidah, S., and Viviati, a. 2001. A study of the epiphytic orchids in Jobolarangan Forest. Biodiversitas Journal of Biological Diversity, 2(2):150-155.

Matsabisa, M.G., Chukwuma, C.I., Ibeji, C.U., and Chaudhary, S.K. 2019. Stem bark exudate (resin) of *A. cunninghamii* Aiton ex D. Don (hoop pine) abates glycation, α-glucosidase and DPP-IV activity and modulates glucose utilization in Chang liver cells and 3T3-L1 adipocytes. South African Journal of Botany, 121:193-1999.

Mofikoya, O. O. 2022. Chemical fingerprinting of conifer needle extracts by ultrahigh-resolution mass spectrometry (Doctoral dissertation, Itä-Suomen yliopisto).

Monick, J. A. 1979. Fatty alcohols. Journal of the American Oil Chemists Society, 56 (11):853A-860A.

Muhaimin, M. dan Yati, N. 2018. Jenis-jenis tumbuhan koleksi Kebun Raya Cibodas sebagai penghasil fraksinasi dan potensi pemanfaatannya. Proseding Seminar Nasional Masyarakat Biodiversitas Indonesia, 2(4):151-157.

Mulyawati, S. A., Yusmiati, Y., dan Eso, A. Uji daya hambat fraksi rumput laut merah *Kappaphycus sp*. terhadap pertumbuhan bakteri *Staphylococcus*

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

aureus. medula: Jurnal Ilmiah Fakultas Kedokteran Universitas Halu Oleo, 4(1):152-202.

Mulyono, N., Wijaya, C. H., Fardiaz, D., dan Rahayu, W. S. 2012. Identifikasi komponen kimia damar mata kucing (*Shorea javanica*) dengan metode pirolisis-GC/MS. Jurnal Natur Indonesia, 14(02):155-159.

Murthy, H. N. 2021. Chemical constituents and applications of gums, resins, and latexes of plant origin. Gums, resins and latexes of plant origin: chemistry, biological activities and uses. Springer Nature. Karnataka, India.

Mutton, D. B. 1962. Wood resins Chapter10. In: Wood extractives and their significance to the pulp and paper industries. Academic Press, 331-363. Canada.

Nisula, L. 2018. Wood extractives in conifers: a study of stemwood and knots of industrially important species (Doctoral dissertation, Åbo Akademis förlag-Åbo Akademi University Press).

Nugroho, A. A., Putra, R. W. Y., Putra, F. G., dan Syazali, M. 2017. Pengembangan blog sebagai media pembelajaran matematika. Al-Jabar: Jurnal Pendidikan Matematika, 8(2):197-203.

O'Neill, F. H., Sanders, T. A., and Thompson, G. R. 2005. Comparison of efficacy of plant stanol ester and sterol ester: short-term and longer-term studies. The American Journal of Cardiology, 96(1):29-36.

Ohlrogge, J., and Browse, J. 1995. Lipid biosynthesis. The Plant Cell, 7(7):957-970.

Okkonen, P., Korpela, A., Sundberg, A., and Holmbom, B. 2002. Effects of different types of lipophilic extractives on paper properties. Nordic Pulp and Paper Research Journal, 17(4):382–386.

Pari, G. D., dan Lestari, F. B. 1990. Analisis kimia beberapa jenis kayu Indonesia. Jurnal Penelitian Hasil Hutan, 7(3):96-100.

Parimal, K., Khale, A., and Pramod, K. 2011. Resins from herbal origin and a focus on their applications. International Journal Pharmaceutical Sciences and Research, 2(5):077-1085.

UNIVERSITAS
GADJAH MADA
KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Pereira, H., Graça, J., and Rodrigues, J. C. 2003. Wood chemistry in relation to quality. Wood quality and its biological basis. Biochemistry (3):53-86.

Perotti, J. C., da Silva Rodrigues-Corrêa, K. C., and Fett-Neto, A. G. 2015. Control of resin production in *Araucaria angustifolia*, an ancient South American conifer. Plant Biology, 17(4):852-859.

Petrus, S., Manurung, T. F., dan Kartikawati, S. M. 2021. Identifikasi jenis pohon famili *Dipterocarpaceae* pada hutan rawa gambut di kawasan hutan dengan tujuan khusus (KHDTK) Universitas Tanjungpura Kecamatan Mandor Kabupaten Landak Kalimantan Barat. Jurnal Hutan Lestari, 9(4):584-598.

Piironen, V., Lindsay, D. G., Miettinen, T. A., Toivo, J., and Lampi, A. M. 2000. Plant sterols: biosynthesis, biological function and their importance to human nutrition. Journal of the Science of Food and Agriculture, 80(7):939-966.

Pisoschi, A. M., Pop, A., Cimpeanu, C., and Predoi, G. 2016. Antioxidant capacity determination in plants and plant-derived products: a review. Oxidative Medicine and Cellular Longevity, (1):913-976. https://doi.org/10.1155/2016/9130976

Puente-Villegas, S. M., García, A. R., Rubio, F., Gil, L., and Lopez, R. 2020. Salicylic and citric acid as promising new stimulants for resin tapping in maritime pine (*Pinus pinaster Ait.*). Forest Systems, 29(3):eSC07-eSC07.

Purwaningsih, P. 2004. Ecological distribution of *Dipterocarpaceae* species in Indonesia. Biodiversitas Journal of Biological Diversity, 5(2):91-95.

Purwanti, S., Wahyuni, W. T., dan Batubara, I. 2019. Antioxidant activity of *Daemonorops draco* resin. Jurnal Kimia Sains dan Aplikasi, 22(5):179-183.

Putra, F.Y., Hermawan dan Azhar. 2021. Pemurnian damar mata kucing (*Shorea javanica*) dengan metode pelarutan. Jurnal Kelitbangan, 9(1): 27-40.

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
Aishah Agustian, Prof. Dr. Ir. Ganis Lukmandaru, S.Hut., M.Agr., IPU ;Dr. Ir. Rizki Arisandi, S.Hut
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Rasul, M. G. 2018. Extraction, isolation and characterization of natural products from medicinal plants. International Journal of Basic Sciences and Applied Computing 2(6):1-6.

Ratnayake, W. N., and Galli, C. 2009. Fat and fatty acid terminology, methods of analysis and fat digestion and metabolism. Annals of Nutrition and Metabolism, 55(1/3):8-43.

Rinawati, Darusman L.K., dan Purnawantiningsih. 1996. Efisiensi fraksinasi komponen isoflavon dari akar kedelai (*Glycine* max (L.) Merr). Buletin Kimia Jurusan Kimia FMIPA-IPB (11): 35-48.

Roszaini, K., Nor Azah, M. A., Mailina, J., Zaini, S., and Mohammad Faridz, Z. 2013. Toxicity and antitermite activity of the essential oils from *Cinnamomum camphora, Cymbopogon nardus, Melaleuca cajuputi* and *Dipterocarpus* sp. against *Coptotermes curvignathus*. Wood Science and Technology, 47:1273-1284.

Salim, S.A., Saputri, F. A., Saptarini, N. M., dan Levita, J. 2020. Kelebihan dan keterbatasan pereaksi Folin-Ciocalteu dalam penentuan kadar fenol total pada tanaman. Farmaka, 18(1):46-57.

Samrot, A. V., Kudaiyappan, T., Bisyarah, U., Mirarmandi, A., Faradjeva, E., Abubakar, A., and Kumar, S. 2020. Extraction, purification, and characterization of polysaccharides of *Araucaria heterophylla* L and *Prosopis chilensis* L and utilization of polysaccharides in nanocarrier synthesis. International Journal of Nanomedicine, 40(8):7097-7115.

Sari, R. K., Batubara, I., Tillah, M., and Tohir, D. 2018. Aktivitas antibakteri resin pinus terhadap *Staphylococcus aureus*. Jurnal Ilmu dan Teknologi Kayu Tropis, 16(1):15-22.

Sari, R. K., Syafii, W., Sofyan, K., and Hanafi, M. 2004. Sifat antirayap resin damar mata kucing dari *Shorea javanica*. Jurnal Ilmu dan Teknologi Kayu Tropis, 2(1):8-15.

Saridan, A., Kholik, A., and Rostiwati, T. 2011. Potensi dan sebaran spesies pohon penghasil minyak keruing di Hutan Penelitian Labanan,

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
Aishah Agustian, Prof. Dr. Ir. Ganis Lukmandaru, S.Hut., M.Agr., IPU ;Dr. Ir. Rizki Arisandi, S.Hut
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Kalimantan Timur. Jurnal Penelitian Sosial dan Ekonomi Kehutanan, 5(1):11-22.

Setiadi, D., Pudjiono, S., Nurtjahjaningsih, I. L. G., Hendrati, R. L., Baskorowati, L., Sulistiadi, H. B. S and Susanto, M. 2024. Early growth performance and genetic variation of *A. cunninghamii* in Bondowoso, East Java Province, Indonesia. In: IOP Conference Series: Earth and Environmental Science, 1315(1):012-022.

Setoguchi, H., Asakawa Osawa, T., Pintaud, J. C., Jaffré, T., and Veillon, J. M. 1998. Phylogenetic relationships within *Araucariaceae* based on rbcL gene sequences. American Journal of Botany, 85(11):1507-1516.

Seyfullah, L. J., Roberts, E. A., Jardine, P. E., Rikkinen, J., and Schmidt, A. R. 2022. Uncovering the natural variability of araucariacean exudates from ex situ and in situ tree populations in New Caledonia using FTIR spectroscopy. PeerJ Analytical Chemistry, 4(17):1-25.

Shalaby, E. A., and Shanab, S. M. 2013. Antioxidant compounds, assays of determination and mode of action. African Journal of Pharmacy and Pharmacology, 7(10):528-539.

Smirnoff, N. 2005. Antioxidants and Reactive Oxygen Species in Plants. Oxford, Blackwell.

SNI 2900.2:2013 Damar Mata Kucing. Badan Standarisasi Nasional, 1-6

SNI 7636-2020 Gondorukem. Badan Standarisasi Nasional, 1-10.

Supriyanto. 2010. Pengembangan sorgum di lahan kering untuk memenuhi kebutuhan pangan, pakan, energi dan Industri. Simposium Nasional 2010: Menuju Purworejo Dinamis dan Kreatif, 45-51.

Somogyi, A., Rosta, K., Pusztai, P., Tulassay, Z., and Nagy, G. 2007. Antioxidant measurements. Physiological Measurement, 28(4):41-55.

Tekgüler, B., Koca, İ., Karadeniz, B., Zannou, O., and Pashazadeh, H. 2021. Antioxidant properties and monoterpene composition of 13 different pine resin samples from Turkey. Commagene Journal of Biology, 5(2):208-213.

KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
Fowx. E
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Tetali, S. D. 2019. Terpenes and isoprenoids: a wealth of compounds for global use. Planta, 249:1-8.

Tetti, M. 2014. Fraksinasi, pemisahan komponen, dan identifikasi komponen aktif. Jurnal Kesehatan, 7(2):361-367.

Tillah, M., Batubara, I., and Sari, R. K. 2017. Antimicrobial and antioxidant activities of resins and essential oil from pine (*Pinus merkusii, Pinus oocarpa, Pinus insularis*) and Agathis (*Agathis loranthifolia*). Journal of Biology and Biology Education, 9(1):134-139.

Uslinawaty, Z., Hadjar, N., Pujirahayu, N., Hamzah, N., Kabe, A., and Nurhafidzah, A. 2021. Quality of pooti dammar resin (*Hopea gregaria*) based on visual test, acid number, and ash Content. Perennial,17(1):1-4.

Valiullina, A. I., Valeeva, A., Zabelkin, S., Grachev, A., Bikbulatova, G., Khaziakhmedova, R., and Bashkirov, V. 2024. Isolation of phenolic fraction from liquid pyrolysis products of wood. Journal of Renewable Energy and Environment, 11(3):52-59.

Verma, Ram S., Padalia, Rajendra C., Goswami, Prakash, Verma, Sajendra K, Chauhan, Amit., Darokar, Mahendra P. 2014. Chemical composition and antibacterial activity of foliage and resin essential oils of *A. cunninghamii* Aiton ex D.Don and *Araucaria heterophylla* (Salisb.) Franco from India. Industrial Crops and Products, 61:410-416.

Von Mueller, F. 1891. Select extra-tropical plants, readily eligible for industrial culture of naturalisation: With Indications of Their Native Countries and Some of Their Uses. Government of Victoria, Melbourne

Widyatmoko, A. Y. P. B. C., Lejo, P., Selda, E., Prasetyaningsih, A., dan Rimbawanto, A. 2010. Keragaman genetik populasi *Araucaria cunninghamii* menggunakan penanda RAPD (*Random Amplified Polymorphic DNA*). Jurnal Pemuliaan Tanaman Hutan, 4(2):63-77.

Willför, S., Hemming, J., Reunanen, M., Eckerman, C., and Holmbom, B. 2003. Lignans and lipophilic extractives in Norway spruce knots and Stemwood. Holzforschung, 57(1):27–36.

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KOMPONEN KIMIA DAN SIFAT ANTIOKSIDAN GETAH RESIN Araucaria cunninghamii dan Dipterocarpus verrucosus
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Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Wiyono, B. 1998. Mempelajari pemisahan minyak atsiri dari damar mata kucing dan sifat fisiko-kimia residunya. Jurnal Penelitian Hasil Hutan, 15(6):363-370.

Yan, X., Lin, J., Liu, Z., David, S. D., Liang, D., Nie, S., and Qiao, J. 2024. The recent progress of tricyclic *aromadendrene*-type seskuiterpens: Biological activities and biosynthesis. Biomolecules, 14(9):1-17.

Yongram, C., Sungthong, B., Puthongking, P., and Weerapreeyakul, N. 2019. Chemical composition, antioxidant and cytotoxicity activities of leaves, bark, twigs and oleo-resin of *Dipterocarpus alatus*. Molecules, 24(17):1-10.

Zonneveld, B. J. M. 2012. Genome sizes of all 19 *Araucaria* species are correlated with their geographical distribution. Plant Systematics and Evolution, 298(7):1249-1255.