



REFERENCES

- Abdi, H. and Williams, L. J. (2010) 'Principal Component Analysis', *Wiley Interdisciplinary Reviews: Computational Statistics*, 2(4), pp. 433–459. doi: 10.1002/wics.101.
- Abdilah, F. and Troskialina, L. (2020) 'Lipid Extraction From Aphanothecace sp. Using Ultrasounds', *Journal of Physics: Conference Series*, 1450(1). doi: 10.1088/1742-6596/1450/1/012004.
- Abe, K., Hattori, H. and Hirano, M. (2007) 'Accumulation and Antioxidant Activity of Secondary Carotenoids in The Aerial Microalga Coelastrella striolata var. multistriata', *Food Chemistry*, 100(2), pp. 656–661. doi: 10.1016/j.foodchem.2005.10.026.
- Addini, I. (2018) 'Aktivitas Antioksidan Fikosianin dari Spirulina platensis dengan Modifikasi Media Kultur Teknis Terbaik', 562, pp. 1–10.
- Adetya, N. P. and Hadiyanto, H. (2018) 'Improvement of Lipid Yield from Microalgae Spirulina platensis Using Ultrasound Assisted Osmotic Shock Extraction Method', *IOP Conference Series: Earth and Environmental Science*, 102(1). doi: 10.1088/1755-1315/102/1/012012.
- Agustini, T. W. et al. (2015) 'Comparative Study of Bioactive Substances Extracted from Fresh and Dried Spirulina sp.', *Procedia Environmental Sciences*. Elsevier B.V., 23(Ictrced 2014), pp. 282–289. doi: 10.1016/j.proenv.2015.01.042.
- Ahmed, F., Zhou, W. and Schenk, P. M. (2015) 'Pavlova lutheri is a High-Level Producer of Phytosterols', *Algal Research*. Elsevier B.V., 10, pp. 210–217. doi: 10.1016/j.algal.2015.05.013.
- Aldeniro, A. B. et al. (2020) 'Production of Bio-Crude Oil from Microalgae Chlorella sp. Using Hydrothermal Liquefaction Process', *Key Engineering Materials*, 849 KEM, pp. 14–19. doi: 10.4028/www.scientific.net/KEM.849.14.
- Alzahrani, M. A. J., Perera, C. O. and Hemar, Y. (2018) 'Production of Bioactive Proteins and Peptides from The Diatom Nitzschia laevis and Comparison of Their In Vitro Antioxidant Activities with Those From Spirulina platensis and Chlorella vulgaris', *International Journal of Food Science and Technology*, 53(3), pp. 676–682. doi: 10.1111/ijfs.13642.
- Amanatin, D. R. and Nurhidayati, T. (2013) 'Pengaruh Kombinasi Konsentrasi Media Ekstrak Tauge (MET) dengan Pupuk Urea terhadap Kadar Protein Spirulina sp.', 2(2), pp. 2–5.
- Amini, S., Fitriani, D. and Sugiyono, S. (2014) 'Pengaruh Perlakuan Pemecahan Dinding Sel Botryococcus braunii dan Nannochloropsis Menggunakan Microwave dan Sonikator terhadap Minyak yang Dihasilkan', *Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan*, 9(1), p. 41. doi: 10.15578/jpbkp.v9i1.98.
- Amini, S., Sugiyono, S. and Saadudin, E. (2011) 'Kandungan Minyak Botryococcus Braunii, Nannochloropsis sp., dan Spirulina Platensis pada Umur yang Berbeda', *Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan*, 6(1), p. 39. doi: 10.15578/jpbkp.v6i1.91.
- Amza, R. L. et al. (2013) 'Screening, Identification and Fatty Acid Composition: Analysis of



- Mercury Resistance Microalgae from Freshwater Pond in Kuranji, Padang, West Sumatera, Indonesia', *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 4(4), pp. 1392–1399.
- Andreas, S. Q., Suminto and Chilmawati, D. (2017) 'Study of Growth Patterns and Cells Quality of Chlorella sp. Produced by Cell Seed Washing Technology', *Journal of Aquaculture Management and Technology*, 4(4), pp. 95–100.
- Anggraini, D., Setyaningsih, I. and Budi Setia Asih, P. (2016) 'Extraction and In Vitro Antimalarial Activity Phycocyanin from Spirulina platensis', *Jurnal Pengolahan Hasil Perikanan Indonesia*, 19(1), pp. 17–25. doi: 10.17844/jphpi.2016.19.1.17.
- Aouir, A. et al. (2017) 'Comparison of The Biochemical Composition of Different Arthrospira platensis Strains From Algeria, Chad and The USA', *Journal of Food Measurement and Characterization*. Springer US, 11(2), pp. 913–923. doi: 10.1007/s11694-016-9463-4.
- Ardianto, R., Nugroho, W. A. and Sutan, S. M. (2015) 'Uji Kinerja Dye Sensitized Solar Cell(DSSC) Menggunakan Lapisan Capacitive Touchscreen Sebagai Substrat dan Ekstrak Klorofil Nannochloropsis Sp. Sebagai Dye Sensitizer dengan Variasi Ketebalan Pasta TiO₂', *Jurnal Keteknikan Pertanian Tropis dan Biosistem*, 3(3), pp. 325–337.
- Arihanda, D. D. P., Suryono and Santosa, G. W. (2019) 'Kadar Total Lipid Mikroalga Nannochloropsis oculata Hibberd, 1981 (Eustigmatophyceae : Eustigmataceae) Berdasarkan Perbedaan Salinitas dan Intensitas Cahaya', *Journal of Marine Research*, 8(3), pp. 229–236.
- Arinto, D. J., Paramastri, H. P. and Soetrisnanto, D. (2013) 'Potensi Air Dadih (Whey) Tahu Sebagai Nutrien dalam Kultivasi Chlorella sp. untuk Bahan Baku Pembuatan Biodesel', *Teknologi Kimia dan Industri*, 2(4), pp. 233–242.
- Arkham, M. N., Agustini, T. W. and Cahyono, B. (2012) 'Analisis Kuantitatif dan Stabilitas B-Karoten pada Biomassa Pasta dan Serbuk dari Mikroalga Porphyridium cruentum dan Formulasinya pada Effervescent', *Perikanan*, 1(2), pp. 1–12.
- Aslan, S. and Kapdan, I. K. (2006) 'Batch Kinetics of Nitrogen and Phosphorus Removal From Synthetic Wastewater by Algae', *Ecological Engineering*, 28(1), pp. 64–70. doi: 10.1016/j.ecoleng.2006.04.003.
- Astuti, J. T. et al. (2016) 'Growth and Fatty Acid Composition of Marine Microalga Nannochloropsis sp in Medium Enriched with Magnesium', *Jurnal Teknologi Lingkungan*, 11(3), p. 409. doi: 10.29122/jtl.v11i3.1186.
- Babu, B. and Wu, J. T. (2008) 'Production of Natural Butylated Hydroxytoluene as an Antioxidant by Freshwater Phytoplankton', *Journal of Phycology*, 44(6), pp. 1447–1454. doi: 10.1111/j.1529-8817.2008.00596.x.
- Baharuddin, M. (2011) 'Analisis Perbedaan Kandungan Lipida Mikroalga (Tetraselmis chuii dan Nannochloropsis oculata) pada Air Laut dan Air Payau', *Teknosains*, 5(1), pp. 26–32.
- Balaïra, G., Kemer, K. and Mantiri, D. (2017) 'Pemisahan Pigmen pada Mikroalga Dunaliella salina



yang Telah Diberi Senyawa Timbal Asetat', *Jurnal Pesisir Dan Laut Tropis*, 1(1), p. 41. doi: 10.35800/jplt.5.1.2017.14995.

Balakrishnama, S. and Ganapathiraju, A. (1998) 'Linear Discriminant Analysis - A Brief Tutorial'.

Barat, W. O. B., Kawaroe, M. and Dietrich GBengen (2017) 'Correlation Between Paddle Wheel Operation Time with Microalgae (*Nannochloropsis* sp.) Growth Rate and Lipid Contents in Open Raceway Ponds', *Omni-Akuatika*, 13(1), pp. 110–116. doi: 10.1038/scientificamerican05081858-278d.

Barbosa, M. J. et al. (2005) 'Optimization of biomass, vitamins, and carotenoid yield on lightenergy in a flat-panel reactor using the A-stat technique', *Biotechnology and Bioengineering*, 89(2), pp. 233–242. doi: 10.1002/bit.20346.

Bariyyah, S. K. et al. (2013) 'Uji Aktivitas Antioksidan terhadap DPPH dan Identifikasi Golongan Senyawa Aktif Ekstrak Kasar Mikroalga Chlorella sp. Hasil Kultivasi dalam Medium Ekstrak Tauge', *Alchemy*, 2(3), pp. 195–204. doi: 10.18860/al.v0i0.2890.

Barkia, I., Saari, N. and Manning, S. R. (2019) 'Microalgae for High-Value Products Towards Human Health and Nutrition', *Marine Drugs*, 17(5), pp. 1–29. doi: 10.3390/md17050304.

Batista, A. P. et al. (2013) 'Comparison of Microalgal Biomass Profiles as Novel Functional Ingredient for Food Products', *Algal Research*. Elsevier B.V., 2(2), pp. 164–173. doi: 10.1016/j.algal.2013.01.004.

Batten, D. F., Campbell, P. K. and Threlfall, G. (2011) 'Resource Potential of Algae for Sustainable Biodiesel Production in the APEC Economies', (September).

Becker, B. (1994) 'Structure, Composition and Biogenesis of Prasinophyte Cell Coverings', *Journal of Phycology*, 181, pp. 233–244. doi: 10.1046/j.1529-8817.1999.00001-14.x.

Becker, E. W. (2007) 'Micro-algae as A Source of Protein', *Biotechnology Advances*, 25(2), pp. 207–210. doi: 10.1016/j.biotechadv.2006.11.002.

Bellotti, W., Lestari, E. and Fukofuka, K. (2018) *A Food Systems Perspective on FoodandNutrition Security in Australia, Indonesia, and Vanuatu*. 1st edn, *Advances in Food Security and Sustainability*. 1st edn. Elsevier Inc. doi: 10.1016/bs.af2s.2018.10.001.

Bernaerts, T. M. M. et al. (2019) 'The Potential of Microalgae and Their Biopolymers as Structuring Ingredients in Food: A Review', *Biotechnology Advances*. Elsevier, 37(8), p. 107419. doi: 10.1016/j.biotechadv.2019.107419.

Berthon, J. Y. et al. (2017) 'Marine Algae as Attractive Source to Skin Care', *Free Radical Research*, 51(6), pp. 555–567. doi: 10.1080/10715762.2017.1355550.

Berts, K. et al. (1985) 'Cell Wall Glycoproteins: Structure and Function', *Cell Science*, 2, pp. 105–127. Available at: http://jcs.biologists.org/content/joces/1985/Supplement_2/105.full.pdf.

Betawati Prihantini et al. (2018) 'Influence of Temperature Variations on Growth of *Nostoc* (Cyanobacteria) HS-5 and HS-20 Isolated from Indonesian Hot Springs', *Microbiology Indonesia*, 12(2), pp. 35–42. doi: 10.5454/mi.12.2.1.



- Blair, M. F., Kokabian, B. and Gude, V. G. (2014) 'Light and Growth Medium Effect on Chlorella vulgaris Biomass Production', *Journal of Environmental Chemical Engineering*. Elsevier B.V., 2(1), pp. 665–674. doi: 10.1016/j.jece.2013.11.005.
- Boni, J., Aida, S. and Leila, K. (2018) 'Lipid Extraction Method from Microalgae Botryococcus braunii As Raw Material to Make Biodiesel with Soxhlet Extraction', *Journal of Physics: Conference Series*, 1095(1). doi: 10.1088/1742-6596/1095/1/012004.
- Borowitzka, M. A. (2013) 'High-Value Products from Microalgae-Their Development and Commercialisation', *Journal of Applied Phycology*, 25(3), pp. 743–756. doi: 10.1007/s10811-013-9983-9.
- Boy, F., Ma'ruf, W. F. and Sumardianto (2016) 'The Effect Harvest Time and Storage Time of Microalgae Chlorella sp. To Chlorophyll Stabilization after MgCO₃ Fixation', *Peng. & Biotek. Hasil Pi.*, 5(2), pp. 10–16.
- Brereton, R. G. (2000) 'Introduction to Multivariate Calibration in Analytical Chemistry', *Analyst*, 125(11), pp. 2125–2154. doi: 10.1039/b003805i.
- Brett, S. J., Perasso, L. and Wetherbee, R. (1994) 'Structure and Development of The Cryptomonad Periplast: A Review', *Protoplasma*, 181(1–4), pp. 106–122. doi: 10.1007/BF01666391.
- Budiardi, T., Utomo, N. B. P. and Santosa, A. (2010) 'Pertumbuhan dan Kandungan Nutrisi Spirulina sp. pada Fotoperiode yang Berbeda', *Jurnal Akuakultur Indonesia*, 9(2), pp. 146–156.
- Busi, M. V. et al. (2014) 'Starch Metabolism in Green Algae', *Starch/Stärke*, 66(1–2), pp. 28–40. doi: 10.1002/star.201200211.
- Del Campo, J. A., García-González, M. and Guerrero, M. G. (2007) 'Outdoor Cultivation of Microalgae for Carotenoid Production: Current State and Perspectives', *Applied Microbiology and Biotechnology*, 74(6), pp. 1163–1174. doi: 10.1007/s00253-007-0844-9.
- Candra Kusuma, T. et al. (2018) 'Effect of Light Intensity, CO₂ Gas Concentration, Culturing Period and Water Nutrient Concentrations on Biomass and Lipid Productivity of Chlorella vulgaris in Sea Water Media', *MATEC Web of Conferences*, 156. doi: 10.1051/matecconf/201815603024.
- Carballo-Cárdenas, E. C. et al. (2003) 'Vitamin E (α -tocopherol) production by the marine microalgae Dunaliella tertiolecta and Tetraselmis suecica in batch cultivation', *Biomolecular Engineering*, 20(4–6), pp. 139–147. doi: 10.1016/S1389-0344(03)00040-6.
- Cavalier-Smith, T. (2010) 'Kingdoms Protozoa and Chromista and The Eozoon Root of The Eukaryotic Tree', *Biology Letters*, 6(3), pp. 342–345. doi: 10.1098/rsbl.2009.0948.
- Chasanah, F. and Andriyono, S. (2015) 'Lipid Analysis of Some Potential Microalgae for Food Supplement Candidate', pp. 1–4.
- Chisholm, S. W. et al. (1988) 'A Novel Free-Living Prochlorophyte Abundant in The Oceanic Euphotic Zone', *Nature*, 334(28), pp. 340–343.
- Chiu, S. Y. et al. (2009) 'Lipid Accumulation and CO₂ Utilization of *Nannochloropsis oculata* in



- Response to CO₂ Aeration', *Bioresource Technology*. Elsevier Ltd, 100(2), pp. 833–838. doi: 10.1016/j.biortech.2008.06.061.
- Chrismadha, T., Sartika, D. and Setyaningsih, I. (2010) 'The Influence of Harvesting Period on Lipid Associated Antioxidant Activity of Semicontinuously Grown Chlorella vulgaris', 14(1), pp. 25–30.
- Conde, E. et al. (2013) *Algal Proteins, Peptides and Amino Acids, Functional Ingredients from Algae for Foods and Nutraceuticals*. doi: 10.1533/9780857098689.1.135.
- Converti, A. et al. (2009) 'Effect of Temperature and Nitrogen Concentration on the Growth and Lipid Content of Nannochloropsis oculata and Chlorella vulgaris for Biodiesel Production', *Chemical Engineering and Processing: Process Intensification*, 48(6), pp. 1146–1151. doi: 10.1016/j.cep.2009.03.006.
- Daliry, S. et al. (2017) 'Investigation of Optimal Condition for Chlorella vulgaris Microalgae Growth', *Global Journal of Environmental Science and Management*, 3(2), pp. 217–230. doi: 10.22034/gjesm.2017.03.02.010.
- Darsi, R., Supriadi, A. and Sasanti, A. D. (2012) 'Karakteristik Kimia dan Potensi Pemanfaatan Dunaliella salina dan Nannochloropsis sp.', *Fishtech*, pp. 55–68.
- Delattre, C. et al. (2016) 'Production, Extraction and Characterization of Microalgal and Cyanobacterial Exopolysaccharides', *Biotechnology Advances*. Elsevier B.V., 34(7), pp. 1159–1179. doi: 10.1016/j.biotechadv.2016.08.001.
- Depraetere, O. et al. (2015) 'Harvesting Carbohydrate-rich Arthrospira platensis by Spontaneous Settling', *Bioresource Technology*. Elsevier Ltd, 180, pp. 16–21. doi: 10.1016/j.biortech.2014.12.084.
- Devita, I., Isnaini and Diansyah, G. (2018) 'Kultivasi Mikroalga Chaetoceros sp. dan Spirulina sp. untuk Potensi Biodiesel', *Jurnal Maspari*, 10(2), pp. 123–130.
- Dewi, E. N., Amalia, U. and Mel, M. (2016) 'The Effect of Different Treatments to the Amino Acid Contents of Microalgae Spirulina sp.', *Aquatic Procedia*. The Author(s), 7, pp. 59–65. doi: 10.1016/j.aqpro.2016.07.008.
- Dewi, R. (2017) 'Produktivitas Minyak Dan Kandungan Asam Lemak Thalassiosira sp. yang Dikultivasi dengan Makronutrien Pupuk', *EduCHemia: Jurnal Kimia dan Pendidikan*, 2(2), pp. 221–235.
- Dianita, I. and Hasibuan, S. (2020) 'The Effect of Phaseolus radiatus Fertilizer at Media Culture to Density and Carotenoid Content of Dunaliella salina', *Jurnal Perikanan Dan Kelautan*, 25(1), pp. 18–26.
- Dianursanti et al. (2018) 'Biodiesel Synthesis Optimization From Wet and Dry Based Microalgae Chlorella vulgaris by Reaction Time Arrangement', *IOP Conference Series: Earth and Environmental Science*, 105(1). doi: 10.1088/1755-1315/105/1/012052.
- Dianursanti, Agustin, Z. L. and Putri, D. N. (2018) 'Increased Lipids Production of Nannochloropsis



- oculata and Chlorella vulgaris for Biodiesel Synthesis Through the Optimization of Growth Medium Composition Arrangement by Using Bicarbonate Addition', *MATEC Web of Conferences*, 154, pp. 1–4. doi: 10.1051/matecconf/201815401009.
- Dianursanti, D. *et al.* (2018) 'The Effect of Nutrient Arrangement on Biomass Growth and Lipid Content of Microalgae Nannochloropsis oculata in Internally Illuminated Bubble Column Photobioreactor', *AIP Conference Proceedings*, 2024. doi: 10.1063/1.5064320.
- Dianursanti, Indraputri, C. M. and Taurina, Z. (2018) 'Optimization of Phycocyanin Extraction from Microalgae Spirulina platensis by Sonication as Antioxidant', *AIP Conference Proceedings*, 1933(February). doi: 10.1063/1.5023960.
- Dianursanti, Nugroho, P. and Prakasa, M. B. (2020) 'Comparison of Maceration and Soxhletation Method for Flavonoid Production from Spirulina platensis as a Sunscreen's Raw Material', *AIP Conference Proceedings*, 2230. doi: 10.1063/5.0002806.
- Dianursanti, Taurina, Z. and Indraputri, C. M. (2018) 'Optimization Growth of Spirulina platensis in Bean Sprouts Extract Medium with Urea Fertilizer for Phycocyanin Production as Antioxidant', *AIP Conference Proceedings*, 1933. doi: 10.1063/1.5023961.
- Djunaedi, A. *et al.* (2017) 'Kandungan Pigmen Fikobiliprotein dan Biomassa Mikroalga Chlorella vulgaris pada Media dengan Salinitas Berbeda', *Jurnal Kelautan Tropis*, 20(2), p. 112. doi: 10.14710/jkt.v20i2.1736.
- Djunaedi, A., Suryono, C. A. and Sardjito, S. (2017) 'Kandungan Pigmen Polar Dan Biomassa Pada Mikroalga Dunaliella Salina Dengan Salinitas Berbeda', *Jurnal Kelautan Tropis*, 20(1), p. 1. doi: 10.14710/jkt.v20i1.1347.
- Domenighini, A. and Giordano, M. (2009) 'Fourier Transform Infrared Spectroscopy of Microalgae as A Novel Tool for Biodiversity Studies, Species Identification, and the Assessment of Water Quality', *Journal of Phycology*, 45(2), pp. 522–531. doi: 10.1111/j.1529-8817.2009.00662.x.
- Dragone, G. *et al.* (2011) 'Nutrient Limitation as A Strategy For Increasing Starch Accumulation in Microalgae', *Applied Energy*. Elsevier Ltd, 88(10), pp. 3331–3335. doi: 10.1016/j.apenergy.2011.03.012.
- Durmaz, Y. (2007) 'Vitamin E (α -tocopherol) Production by the Marine Microalgae Nannochloropsis oculata (Eustigmatophyceae) in Nitrogen Limitation', *Aquaculture*, 272(1–4), pp. 717–722. doi: 10.1016/j.aquaculture.2007.07.213.
- Dvoretsky, D. *et al.* (2015) 'Optimization of the Process of Cultivation of Microalgae Chlorella vulgaris Biomass with High Lipid Content for Biofuel Production', *Chemical Engineering Transactions*, 43, pp. 361–366. doi: 10.3303/CET1543061.
- Edelmann, M. *et al.* (2019) 'Riboflavin, Niacin, Folate and Vitamin B12 in Commercial Microalgae Powders', *Journal of Food Composition and Analysis*. Elsevier, 82(May), p. 103226. doi: 10.1016/j.jfca.2019.05.009.
- Ejike, C. E. C. C. *et al.* (2017) 'Prospects of Microalgae Proteins in Producing Peptide-Based



- Functional Foods for Promoting Cardiovascular Health', *Trends in Food Science and Technology*. Elsevier Ltd, 59, pp. 30–36. doi: 10.1016/j.tifs.2016.10.026.
- Elfiza, W. N. and Dharma, A. (2019) 'Pengaruh Stres Nitrogen dan Fosfor Terhadap Produksi Betakaroten Pada Mikroalga *Oocystis* sp.', *JPB Kelautan dan Perikanan*, 14(1), pp. 9–20.
- Elystia, S. *et al.* (2019) 'Peningkatan Kandungan Lipid dan Biomassa Mikroalga *Scenedesmus* sp. dari Media Kultivasi Limbah Cair Tahu sebagai Bahan Baku Biodiesel', 5(2), pp. 19–28.
- Elystia, S., Muria, S. R. and Pertwi, S. I. P. (2019) 'Pemanfaatan Mikroalga *Chlorella* sp untuk Produksi Lipid Dalam Media Limbah Cair Hotel Dengan Variasi Rasio C:N dan Panjang Gelombang Cahaya', *Jurnal Sains & Teknologi Lingkungan*, 11(1), pp. 25–43. doi: 10.20885/jstl.vol11.iss1.art3.
- Endrawati, H. (2013) 'Kadar Total Lipid Mikroalga *Nannochloropsis oculata* yang Dikultur Dengan Suhu yang Berbeda', *Buletin Oseanografi Marina*, 2(1), pp. 25–33. doi: 10.14710/buloma.v2i1.6923.
- Endrawati, H. and Manulang, C. (2012) 'Densitas dan Kadar Total Lipid Mikroalga *Spirulina platensis* yang Dikultur pada Fotoperioda yang Berbeda', *Buletin Oseanografi Marina*, 1(3), pp. 33–38. doi: 10.14710/buloma.v1i3.6908.
- Ermavitalini, D. *et al.* (2017) 'Efek of Gamma 60Co Irradiation on The Growth, Lipid Content and Fatty Acid Composition of *Botryococcus* sp. Microalgae', *Biosaintifika: Journal of Biology & Biology Education*, 9(1), p. 58. doi: 10.15294/biosaintifika.v9i1.6783.
- Ermavitalini, D. *et al.* (2019) 'Pengaruh Kombinasi Cekaman Nitrogen dan Fotoperiode terhadap Biomassa, Kandungan Kualitatif Triasilgliserol dan Profil Asam Lemak Mikroalga *Nannochloropsis* sp.', *Akta Kimindo*, 4(1), pp. 32–49.
- Fábregas, J. *et al.* (2004) 'The Cell Composition of *Nannochloropsis* sp. Changes Under Different Irradiances in Semicontinuous Culture', *World Journal of Microbiology and Biotechnology*, 20(1), pp. 31–35. doi: 10.1023/B:WIBI.0000013288.67536.ed.
- Fadhilah, I. *et al.* (2019) 'Lipid Contain of Three Microalgae on Culture with Different pH and Salinity', (February), pp. 1–12.
- Fakhri, M., Sanudi, *et al.* (2017) 'Effect of Photoperiod Regimes on Growth, Biomass and Pigment Content of *Nannochloropsis* sp. BJ17', *Asian Journal of Microbiology, Biotechnology and Environmental Sciences*, 19(2), pp. 263–267.
- Fakhri, Muhammad *et al.* (2017) 'Growth, Biomass, and Chlorophyll-a and Carotenoid Content of *Nannochloropsis* sp. strain BJ17 Under Different Light Intensities', *Jurnal Akuakultur Indonesia*, 16(1), p. 15. doi: 10.19027/jai.16.1.15-21.
- Fakhri, M., Arifin, N. B., *et al.* (2017) 'The Influence of Salinity on the Growth and Chlorophyll Content of *Nannochloropsis* sp. BJ17', pp. 15–18.
- Fakhri, M. *et al.* (2020) 'Pertumbuhan, Kandungan Pigmen, dan Protein *Spirulina platensis* yang Dikultur Pada Ca(NO₃)₂ Dengan Dosis yang Berbeda', *Journal of Aquaculture and Fish Health*,



9(1), pp. 38–47.

- Farihah, S., Yulianto, B. and Yudiaty, E. (2014) ‘Penentuan Kandungan Pigmen Fikobiliprotein Ekstrak Spirulina platensis dengan Teknik Ekstraksi Berbeda dan Uji Toksitas Metode BLST’, *Diponegoro Journal of Marine Research*, 3(2), pp. 140–146.
- Febriani, R., Hasibuan, S. and Syafriadiman (2020) ‘Pengaruh Intensitas Cahaya Berbeda terhadap Kepadatan dan Kandungan Karotenoid Dunaliella salina’, *Jurnal Perikanan dan Kelautan*, 25(1), pp. 36–43.
- Fernández del Amo, I. et al. (2018) ‘A Systematic Review of Augmented Reality Content-Related Techniques for Knowledge Transfer in Maintenance Applications’, *Computers in Industry*. Elsevier B.V., 103, pp. 47–71. doi: 10.1016/j.compind.2018.08.007.
- Ferreira, V. S., Pinto, R. F. and Sant’Anna, C. (2016) ‘Low Light Intensity and Nitrogen Starvation Modulate the Chlorophyll Content of *Scenedesmus dimorphus*’, *Journal of Applied Microbiology*, 120(3), pp. 661–670. doi: 10.1111/jam.13007.
- Finkel, Z. V. et al. (2016) ‘Phylogenetic Diversity in the Macromolecular Composition of Microalgae’, *PLoS ONE*, 11(5), pp. 1–16. doi: 10.1371/journal.pone.0155977.
- Fithriani, D. et al. (2015) ‘Uji Fitokimia, Kandungan Total Fenol dan Aktivitas Antioksidan Mikroalga Spirulina sp., Chlorella sp., dan Nannochloropsis sp.’, *Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan*, 10(2), p. 101. doi: 10.15578/jpbkp.v10i2.270.
- Fithriani, D., Ambarwaty, D. and Nurhayati (2020) ‘Identification of Bioactive Compounds from Nannochloropsis sp.’, *IOP Conference Series: Earth and Environmental Science*, 404(1).doi: 10.1088/1755-1315/404/1/012064.
- Fithriani, D., Dinawati, L. and A, O. D. (2018) ‘Pengaruh Umur Pertumbuhan Mikroalga Chlorella sp. Terhadap Kandungan Pigmen Klorofil, Karotenoid, Fikosianin Dan Fikoeritrin’, *Seminar Nasional Tahunan XV Hasil Penelitian Perikanan dan Kelautan*, pp. 123–126.
- Fithriani, D. and Nurhayati (2019) ‘Optimization of the Condition of Phytosterol Extraction Conditions from Microalgae Nannochloropsis Using Ethanol of Different Purity Levels’, *Journal of Bio-Science*, 27, pp. 143–148. doi: 10.3329/jbs.v27i0.44679.
- Fithriani, D. and Sinurat, E. (2019) ‘Utilization of Spirulina as Functional Food: Phytosterol and Amino Acid Profiles Study’, *IOP Conference Series: Earth and Environmental Science*, 278(1), pp. 8–12. doi: 10.1088/1755-1315/278/1/012028.
- Fox, J. M. and Zimba, P. V. (2018) *Minerals and Trace Elements in Microalgae*, *Microalgae in Health and Disease Prevention*. Elsevier Inc. doi: 10.1016/B978-0-12-811405-6.00008-6.
- Francavilla, M., Trotta, P. and Luque, R. (2010) ‘Phytosterols from Dunaliella tertiolecta and Dunaliella salina: A Potentially Novel Industrial Application’, *Bioresource Technology*. Elsevier Ltd, 101(11), pp. 4144–4150. doi: 10.1016/j.biortech.2009.12.139.
- Fransiscus, Y. and Purwanto, E. (2017) ‘Cultivation of Chlorella vulgaris Using Different Sources of Carbon and its Impact on Lipid Production’, *AIP Conference Proceedings*, 1840. doi:



10.1063/1.4982265.

Friendly, M. and Kwan, E. (2003) 'Effect Ordering for Data Displays', 43, pp. 509–539.

Galasso, C. et al. (2019) 'Microalgal Derivatives as Potential Nutraceutical and Food Supplements for Human Health: A Focus on Cancer Prevention and Interception', *Nutrients*, 11(6), pp. 1–22. doi: 10.3390/nu11061226.

Van Ginkel, J. R., Kroonenberg, P. M. and Kiers, H. A. L. (2014) 'Missing Data in Principal Component Analysis of Questionnaire Data: A Comparison of Methods', *Journal of Statistical Computation and Simulation*, 84(11), pp. 2298–2315. doi: 10.1080/00949655.2013.788654.

Gladyshhev, M. I., Sushchik, N. N. and Makhutova, O. N. (2013) 'Production of EPA and DHA in Aquatic Ecosystems and Their Transfer to The Land', *Prostaglandins and Other Lipid Mediators*. Elsevier Inc., 107, pp. 117–126. doi: 10.1016/j.prostaglandins.2013.03.002.

Goris, K. et al. (2012) 'Antioxidant Potential of Microalgae in Relation to Their Phenolic and Carotenoid Content', *Journal of Applied Phycology*, 24(6), pp. 1477–1486. doi: 10.1007/s10811-012-9804-6.

González-Fernández, C. and Ballesteros, M. (2012) 'Linking Microalgae and Cyanobacteria Culture Conditions and Key-Enzymes for Carbohydrate Accumulation', *Biotechnology Advances*. Elsevier Inc., 30(6), pp. 1655–1661. doi: 10.1016/j.biotechadv.2012.07.003.

Gouveia, L. et al. (2010) 'Microalgae – Source of Natural Bioactive Molecules as Functional Ingredients', *Food Science & Technology Bulletin: Functional Foods*, 7(2), pp. 21–37. doi: 10.1616/1476-2137.15884.

Guil-Guerrero, J. L. et al. (2004) 'Functional Properties of the Biomass of Three Microalgal Species', *Journal of Food Engineering*, 65(4), pp. 511–517. doi: 10.1016/j.jfoodeng.2004.02.014.

Gustiningtyas, A. et al. (2020) 'Improvement Stability of Phycocyanin from Spirulina platensis Encapsulated by Water Soluble Chitosan Nanoparticles', *IOP Conference Series: Earth and Environmental Science*, 414(1). doi: 10.1088/1755-1315/414/1/012005.

Hadi, R. P., Setyawati, T. R. and Mukarlina (2015) 'Kandungan Protein dan Kepadatan Sel Nannochloropsis oculata pada Media Kultur Limbah Cair Karet', *Protobiont*, 4(1), pp. 120–127. Available at: <http://download.portalgaruda.org/article.php?article=319695&val=2325&title=Kandungan+Protein+dan+Kepadatan+Sel+Nannochloropsis+oculata+pada+Media+Kultur+Limbah+Cair+Karet>.

Hafiz Pranajaya, R., Djunaedi, A. and Yulianto, D. B. (2014) 'Pengaruh Tembaga Terhadap Kandungan Pigmen dan Pertumbuhan Mikroalga Merah Porphyridiumcruentum', 19(2), pp. 97–104.

Hala, Y. et al. (2018) 'Contribution of Co²⁺ in Increasing Chlorophyll a Concentration of Nannochloropsis salina in Controlled Conwy Medium', *Journal of Physics: Conference Series*, 979(1), pp. 8–14. doi: 10.1088/1742-6596/979/1/012013.

Hamed, I. (2016) 'The Evolution and Versatility of Microalgal Biotechnology: A Review',



Comprehensive Reviews in Food Science and Food Safety, 15(6), pp. 1104–1123. doi: 10.1111/1541-4337.12227.

- Hanani, T., Widowati, I. and Susanto, A. (2020) ‘Kandungan Senyawa Beta Karoten pada *Spirulina platensis* dengan Perlakuan Perbedaan Lama Waktu Pencahayaan’, *Buletin Oseanografi Marina*, 9(1), pp. 55–58. doi: 10.14710/buloma.v9i1.24681.
- Hapsari, D. T., Agustini, T. W. and Cahyono, B. (2012) ‘Analisis Kimia dan Fisik Komponen Beta-Karoten dalam Mikroalga *Porphyridium cruentum*’. Available at: <http://library1.nida.ac.th/termpaper6/sd/2554/19755.pdf>.
- Harahap, P. et al. (2013) ‘Pengaruh Substitusi Limbah Cair Tahu Untuk Menstimulasi Pembentukan Lipida Pada *Chlorella sp.*’, *Diponegoro Journal of Marine Research*, 2(1), pp. 80–86. doi: 10.14710/jmr.v2i1.2070.
- Hartati, R. et al. (2012) ‘Pengaruh Pengurangan Konsentrasi Nutrien Fosfat dan Nitrat Terhadap Kandungan Lipid Total *Nannochloropsis oculata*’, *Ilmu Kelautan: Indonesian Journal of Marine Sciences*, 16(1), pp. 24–29–29. doi: 10.14710/ik.ijms.16.1.24–29.
- Harun, R. et al. (2010) ‘Bioprocess Engineering of Microalgae to Produce a Variety of Consumer Products’, *Renewable and Sustainable Energy Reviews*, 14(3), pp. 1037–1047. doi: 10.1016/j.rser.2009.11.004.
- Harwati, T. U., Willke, T. and Vorlop, K. D. (2012) ‘Characterization of the Lipid Accumulation in a Tropical Freshwater Microalgae *Chlorococcum sp.*’, *Bioresource Technology*. Elsevier Ltd, 121, pp. 54–60. doi: 10.1016/j.biortech.2012.06.098.
- Hasanudin, M. (2012) ‘Pengaruh Perbedaan Intensitas Cahaya terhadap Pertumbuhan dan Kadar Lipid Mikroalga *Scenedesmus sp.* yang Dibudidayakan Pada Limbah Cair Tapioka’, *Etheses of Maulana Malik Ibrahim State Islamic University*, pp. 1–81. Available at: <http://etheses.uin-malang.ac.id/872/>.
- He, Q. et al. (2015) ‘Effect of Light Intensity on Physiological Changes, Carbon Allocation and Neutral Lipid Accumulation in Oleaginous Microalgae’, *Bioresource Technology*. Elsevier Ltd, 191, pp. 219–228. doi: 10.1016/j.biortech.2015.05.021.
- Hecky, R. E. et al. (1973) ‘The Amino Acid and Sugar Composition of Diatom Cell-Walls’, *Marine Biology*, 19(4), pp. 323–331. doi: 10.1007/BF00348902.
- Heimann, K. and Huerlimann, R. (2015) ‘Microalgal Classification : Major Classes and Genera of Commercial Microalgal Species’, pp. 25–41. doi: 10.1016/B978-0-12-800776-1.00003-0.
- Hemaiswarya, S. et al. (2013) ‘Microalgae Taxonomy and Breeding’, *Biofuel Crops: Production, Physiology and Genetics*, (June), pp. 44–53. doi: 10.1079/9781845938857.0044.
- Herawati, E. Y. (2019) ‘Identifikasi Jenis-Jenis Phytoplankton pada Tambak Bandeng dengan Kualitas Omega-3 Tinggi’, *Journal of Fisheries and Marine Research*, 3(2), pp. 258–262.
- Hermansyah et al. (2018) ‘Bioethanol Production from Microalgae *Oscillatoria sp* Cultured in Blue Green 11 and Bold Basal Media’, *E3S Web of Conferences*, 68, pp. 4–11. doi:



10.1051/e3sconf/20186803018.

- Hernandi, R., Dharma, A. and Armaini, A. (2019) ‘Penapisan, Isolasi, dan Karakterisasi Mikroalga yang Berpotensi sebagai Sumber Biodiesel dari Perairan Danau Kerinci, Jambi’, *Jurnal Litbang Industri*, 9(1), p. 41. doi: 10.24960/jli.v9i1.4326.41-49.
- Hidayat, A. (2016) ‘Physico-Chemical Characteristics of Bio-Oil From Nannochloropsis sp and Tetraselmis As a Sustainable Energy Source’, *Teknoin*, 22(10), pp. 718–725. doi: 10.20885/teknoin.vol22.iss10.art6.
- Hidayati, J. R. et al. (2020) ‘Comparative Study on Antioxidant Activities, Total Phenolic Compound and Pigment Contents of Tropical Spirulina platensis, Gracilaria arcuata and Ulva lactuca Extracted in Different Solvents Polarity’, *E3S Web of Conferences*, 147. doi: 10.1051/e3sconf/202014703012.
- Hidhayati, N. et al. (2020) ‘Potency of Phycobiliprotein Pigment as Antioxidant and Biological Toxicity Agents from Cyanobacteria Chroococcus turgidus’, *Biopropal Industri*, 11(1), pp. 41–48. doi: 10.36974/jbi.v11i1.5540.
- Hindarti, D. and Larasati, A. W. (2019) ‘Copper (Cu) and Cadmium (Cd) Toxicity on Growth, Chlorophyll-a and Carotenoid Content of Phytoplankton Nitzschia sp.’, *IOP Conference Series: Earth and Environmental Science*, 236(1). doi: 10.1088/1755-1315/236/1/012053.
- Hindarti, D. and Permana, R. (2020) ‘Cadmium Effects on Growth and Photosynthetic Pigment Content of Chaetoceros gracilis’, 145(April), pp. 245–255.
- Ho, S. H. et al. (2018) ‘Combining Light Strategies with Recycled Medium to Enhance the Economic Feasibility of Phycocyanin Production with Spirulina platensis’, *Bioresource Technology*. Elsevier Ltd, 247, pp. 669–675. doi: 10.1016/j.biortech.2017.09.165.
- Hu, Q. et al. (2008) ‘Microalgal Triacylglycerols as Feedstocks for Biofuel Production: Perspectives and Advances’, *Plant Journal*, 54(4), pp. 621–639. doi: 10.1111/j.1365-313X.2008.03492.x.
- Ilhami, B. T. K. et al. (2015) ‘Pengaruh Perbedaan Umur Panen Terhadap Kandungan Lemak Nitzschia sp.’, *Jurnal Biologi Tropis*, 15(2), pp. 145–155.
- Indrayani, I. et al. (2020) ‘Growth, biomass and lipid productivity of a newly isolated tropical marine diatom, skeletonema sp. Uho29, under different light intensities’, *Biodiversitas*, 21(4), pp. 1498–1503. doi: 10.13057/biodiv/d210430.
- Insan, A. I. et al. (2018) ‘The Lipid Content of The Culture Microalgae Using Media of Tapioca Liquid Waste’, *Biosaintifika*, 10(2), pp. 439–447.
- Iriani, D., Hasan, B. and Sumarto (2017) ‘Pengaruh Konsentrasi Ion Fe³⁺ yang Berbeda Terhadap Kandungan Klorofil a dan b, Karotenoid dan Antioksidan dari Chlorella sp.’, *Berkala Perikanan Terubuk*, 45(1), pp. 48–58.
- Jacob-Lopes, E. et al. (2019) ‘Bioactive Food Compounds From Microalgae: an Innovative Framework on Industrial Biorefineries’, *Current Opinion in Food Science*, 25, pp. 1–7. doi: 10.1016/j.coofs.2018.12.003.



- Jati, B. N. *et al.* (2019) ‘Ekstraksi dan Identifikasi Fitosterol pada Mikroalga *Nannochloropsis ocellata*’, *Jurnal Kimia dan Kemasan*, 41(1), pp. 31–36. doi: 10.24817/jkk.v41i1.4969.
- Jati, F., Hutabarat, J. and Herawati, V. E. (2012) ‘Pengaruh Penggunaan Dua Jenis Media Kultur Teknis yang Berbeda Terhadap Pola Pertumbuhan, Kandungan Protein dan Asam Lemak Omega 3 EPA (*Chaetoceros gracilis*)’, *Journal of Aquaculture Management and Technology*, 1(1), pp. 221–235.
- Jawa, I. U., Ridlo, A. and Djunaedi, A. (2014) ‘Kandungan Total Lipid Chlorella Vulgaris yang Dikultur Dalam Media yang Diinjeksi CO₂’, *Diponegoro Journal of Marine Research*, 3(4), pp. 578–585. doi: 10.14710/jmr.v3i4.11418.
- Jay, M. I., Kawaroe, M. and Effendi, H. (2018) ‘Lipid and Fatty Acid Composition Microalgae Chlorella vulgaris Using Photobioreactor and Open Pond’, *IOP Conference Series: Earth and Environmental Science*, 141(1). doi: 10.1088/1755-1315/141/1/012015.
- Jeffrey, S. W., Wright, S. W. and Zapata, M. (2012) *Microalgal Classes and Their Signature Pigments, Phytoplankton Pigments*. doi: 10.1017/cbo9780511732263.004.
- Julianti, E. *et al.* (2019) ‘Optimization of Extraction Method and Characterization of Phycocyanin Pigment from *Spirulina platensis*’, *Journal of Mathematical and Fundamental Sciences*, 51(2), pp. 168–176. doi: 10.5614/j.math.fund.sci.2019.51.2.6.
- Junaidi, A. B. *et al.* (2014) ‘Ekstraksi Lipid dari Biomassa *Synechococcus* sp. dengan Metode Osmotic Shock’, *Sains dan Terapan Kimia*, 8(2), pp. 94–102.
- Juneja, A., Ceballos, R. M. and Murthy, G. S. (2013) ‘Effects of Environmental Factors and Nutrient Availability on The Biochemical Composition of Algae for Biofuels Production: A Review’, *Energies*, 6(9), pp. 4607–4638. doi: 10.3390/en6094607.
- K. Y. Lim, D. and M. Schenk, P. (2017) ‘Microalgae Selection and Improvement as Oil Crops: GM vs Non-GM Strain Engineering’, *AIMS Bioengineering*, 4(1), pp. 151–161. doi: 10.3934/bioeng.2017.1.151.
- Kaçka, A. and Dönmez, G. (2008) ‘Isolation of *Dunaliella* spp. from a Hypersaline Lake and Their Ability to Accumulate Glycerol’, *Bioresource Technology*, 99(17), pp. 8348–8352. doi: 10.1016/j.biortech.2008.02.042.
- Kalsum, L. *et al.* (2019) ‘Lipid Extraction from Microalgae *Spirulina Platensis* for Raw Materials of Biodiesel’, *Journal of Physics: Conference Series*, 1167(1). doi: 10.1088/1742-6596/1167/1/012051.
- Kalsum, U. *et al.* (2019) ‘Lipid Extraction from *Spirulina platensis* Using Microwave for Biodiesel Production’, *Korean Chemical Engineering Research*, 57(2), pp. 301–304. doi: 10.9713/kcer.2019.57.2.301.
- Kamioka, H. (2019) ‘Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (Prisma-P) 2015 Statement’, *Japanese Pharmacology and Therapeutics*, 47(8), pp. 1177–1185.
- Kasim, S. *et al.* (2017) ‘Potensi Produksi Biofuel Dari Biomassa Fitoplankton Laut Spesies Chlorella



- vulgaris, Dunaliella salina, dan Spirulina sp., yang Ditumbuhkan Dalam Nutrien Unggul “MSSIP” Terinduksi Ion Logam Fe, Co, dan Ni’, *Kovalen*, 3(1), p. 89. doi: 10.22487/j24775398.2017.v3.i1.8238.
- Kasim, S. and Sjahrul, M. (2012) ‘Isolation and Identification of Marine Phytoplanktons for Production of Carbohydrate Type Biomass’, *Eur. Chem. Bull.*, 1(8), pp. 311–316. doi: 10.17628/ECB.2012.1.311.
- Kawaroe, M., Sudrajat, A., et al. (2015) ‘Chemical Mutagenesis of Microalgae *Nannochloropsis* sp. Using EMS (Ethyl Methanesulfonate)’, *British Journal of Applied Science & Technology*, 8(5), pp. 494–505. doi: 10.9734/bjast/2015/16862.
- Kawaroe, M., Prartono, T., et al. (2015) ‘Effect of Ethyl Methane Sulfonate (EMS) on Cell Size, Fatty Acid Content, Growth Rate, and Antioxidant Activities of Microalgae *Dunaliella* sp.’, *AACL Bioflux*, 8(6), pp. 924–932.
- Kermanshahi-pour, A. et al. (2014) ‘Enzymatic and Acid Hydrolysis of *Tetraselmis suecica* for Polysaccharide Characterization’, *Bioresource Technology*. Elsevier Ltd, 173, pp. 415–421. doi: 10.1016/j.biortech.2014.09.048.
- Khairuddin and Sahabuddin (2013) ‘Komposisi Nutrien dan Pertumbuhan Mikroalga *Chaetoceros gracilis* yang Dikultur pada Berbagai Konsentrasi Karbodioksida’, *Jurnal Galung Tropika*, 2(2), pp. 106–115.
- Khairunnisa, Karina, S. and Kurnianda, V. (2018) ‘Isolasi Senyawa Bioaktif dari *Oscillatoria* sp. Sebagai Antibakteri *Escherichia coli*’, *Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan Unsyiah*, 3(1), pp. 121–127.
- Khalil, Z. I. et al. (2010) ‘Effect of pH on Growth and Biochemical Responses of *Dunaliella bardawil* and *Chlorella ellipsoidea*’, *World Journal of Microbiology and Biotechnology*, 26(7), pp. 1225–1231. doi: 10.1007/s11274-009-0292-z.
- Khan, M. I. et al. (2016) ‘Enhancing the Feasibility of *Microcystis aeruginosa* as a Feedstock for Bioethanol Production Under the Influence of Various Factors’, *BioMed Research International*, 2016. doi: 10.1155/2016/4540826.
- Khan, M. I., Shin, J. H. and Kim, J. D. (2018) ‘The Promising Future of Microalgae: Current Status, Challenges, and Optimization of a Sustainable and Renewable Industry for Biofuels, Feed, and Other Products’, *Microbial Cell Factories*. BioMed Central, 17(1), pp. 1–21. doi: 10.1186/s12934-018-0879-x.
- Khanra, S. et al. (2018) ‘Downstream Processing of Microalgae for Pigments, Protein and Carbohydrate in Industrial Application: A Review’, *Food and Bioproducts Processing*. Institution of Chemical Engineers, 110, pp. 60–84. doi: 10.1016/j.fbp.2018.02.002.
- Khatoon, H. et al. (2018) ‘Effects of Different Light Source and Media on Growth and Production of Phycobiliprotein from Freshwater Cyanobacteria’, *Bioresource Technology*, 249, pp. 652–658. doi: 10.1016/j.biortech.2017.10.052.



- Khoo, K. S. *et al.* (2019) 'Recent Advances in Biorefinery of Astaxanthin from *Haematococcus pluvialis*', *Bioresource Technology*. Elsevier Ltd, 288, p. 121606. doi: 10.1016/j.biortech.2019.121606.
- Khumaidi, A. *et al.* (2020) 'Morphology, Molecular, and Nutritional Value of *Amphora* sp. from Coastal Water of the Grouper Cultivation Center (Situbondo, Indonesia)', *Ecology, Environment and Conservation*, 26(2), pp. 943–949.
- Kim, J. on and Curry, J. (1977) 'The Treatment of Missing Data in Multivariate Analysis', *Sociological Methods & Research*, 6(2), pp. 215–240. doi: 10.1177/004912417700600206.
- Kim, S. M. *et al.* (2012) 'A Potential Commercial Source of Fucoxanthin Extracted from The Microalga *Phaeodactylum tricornutum*', *Applied Biochemistry and Biotechnology*, 166(7), pp. 1843–1855. doi: 10.1007/s12010-012-9602-2.
- Kloek, T. (2018) 'Principal Components', *The New Palgrave Dictionary of Economics*, pp. 10747–10749. doi: 10.1057/978-1-349-95189-5_1776.
- Koller, M., Muhr, A. and Braunegg, G. (2014) 'Microalgae as Versatile Cellular Factories for Valued Products', *Algal Research*. Elsevier B.V., 6(PA), pp. 52–63. doi: 10.1016/j.algal.2014.09.002.
- Kong, W. *et al.* (2011) 'The Characteristics of Biomass Production, Lipid Accumulation and Chlorophyll Biosynthesis of *Chlorella vulgaris* Under Mixotrophic Cultivation', *African Journal of Biotechnology*, 10(55), pp. 11620–11630. doi: 10.5897/AJB11.617.
- Kose, A. *et al.* (2017) 'Investigation of In Vitro Digestibility of Dietary Microalga *Chlorella vulgaris* and Cyanobacterium *Spirulina platensis* as a Nutritional Supplement', *3 Biotech*. Springer Berlin Heidelberg, 7(3). doi: 10.1007/s13205-017-0832-4.
- Kristiawan, O. *et al.* (2018) 'Pengaruh Bikarbonat Terhadap Pertumbuhan Mikroalga *Nannochloropsis* sp. sebagai Sumber Biomassa Biofuel', *Lembaran Publikasi Minyak dan Gas Bumi*, 52(2), pp. 95–103.
- Kumar, N. *et al.* (2014) 'Chemometrics Tools Used in Analytical Chemistry: An Overview', *Talanta*. Elsevier, 123, pp. 186–199. doi: 10.1016/j.talanta.2014.02.003.
- Kurnia, D. *et al.* (2020) 'Aktivitas Antioksidan dan Penetapan Kadar Fenol Total dari Mikroalga Laut *Chlorella vulgaris*', *Jurnal Kimia Riset*, 5(1), p. 14. doi: 10.20473/jkr.v5i1.19823.
- Kwangdinata, R., Raya, I. and Zakir, M. (2013) 'Produksi Biodiesel dari Lipid Fitoplankton *Nannochloropsis* sp. melalui Metode Ultrasonik', *Marina Chimica Acta*, 1(2), pp. 28–36. Available at: <http://journal.unhas.ac.id/index.php/mca/article/view/1187>.
- Kwangdinata, R., Raya, I. and Zakir, M. (2014) 'Production of Biodiesel From Lipid of Phytoplankton *Chaetoceros calcitrans* Through Ultrasonic Method', *The Scientific World Journal*, 2014. doi: 10.1155/2014/231361.
- Lafarga, T. (2020) 'Cultured Microalgae and Compounds Derived Thereof for Food Applications: Strain Selection and Cultivation, Drying, and Processing Strategies', *Food Reviews*



- International*. Taylor & Francis, 36(6), pp. 559–583. doi: 10.1080/87559129.2019.1655572.
- Lante, S. and Herlinah, H. (2015) ‘Pengaruh Pakan Alami Chaetoceros spp. terhadap Perkembangan dan Sintasan Larva Udang Windu, *Penaeus monodon*’, *Jurnal Riset Akuakultur*, 10(3), p.389. doi: 10.15578/jra.10.3.2015.389-396.
- Le, A. (1998) ‘Linear Discriminant Analysis Program’. doi: 10.4018/978-1-59140-830-7.ch003.
- Levasseur, W., Perré, P. and Pozzobon, V. (2020) ‘A Review of High Value-Added Molecules Production by Microalgae in Light of The Classification’, *Biotechnology Advances*. Elsevier, 41(January), p. 107545. doi: 10.1016/j.biotechadv.2020.107545.
- Li, J. et al. (2014) ‘Enhanced Production of the Nonribosomal Peptide Antibiotic Valinomycin in *Escherichia coli* Through Small-Scale High Cell Density Fed-Batch Cultivation’, *Applied Microbiology and Biotechnology*, 98(2), pp. 591–601. doi: 10.1007/s00253-013-5309-8.
- Li, Y., Wei, G. and Chen, J. (2004) ‘Glutathione: A Review on Biotechnological Production’, *Applied Microbiology and Biotechnology*, 66(3), pp. 233–242. doi: 10.1007/s00253-004-1751-y.
- Liestianty, D. et al. (2019) ‘Nutritional Analysis of Spirulina sp to Promote as Superfood Candidate’, *IOP Conference Series: Materials Science and Engineering*, 509(1). doi: 10.1088/1757-899X/509/1/012031.
- Liu, B. H. and Lee, Y. K. (2000) ‘Secondary Carotenoids Formation by the Green Alga *Chlorococcum* sp’, *Journal of Applied Phycology*, 12(3–5), pp. 301–307. doi: 10.1023/a:1008185212724.
- Liu, W. Y. et al. (2008) ‘Visualization Classification Method of Multi-Dimensional Data Based on Radar Chart Mapping’, *Proceedings of the 7th International Conference on Machine Learning and Cybemetics, ICMLC*, 2(July), pp. 857–862. doi: 10.1109/ICMLC.2008.4620524.
- Maligan, J. M., Marditia, A. P. and Putri, W. D. R. (2015) ‘Analisis Senyawa Bioaktif Ekstrak Mikroalga Laut *Tetraselmis chuii* Sebagai Sumber Antioksidan Alami’, *Jurnal Rekapangan*, 9(2), pp. 1–10.
- Marini, F. (2015) ‘Chemometrics’, *Encyclopedia of Food and Health*, 82(12), pp. 1–9. doi: 10.1016/B978-0-12-384947-2.00779-0.
- Markou, G., Angelidaki, I. and Georgakakis, D. (2012) ‘Microalgal Carbohydrates: An overview of The Factors Influencing Carbohydrates Production, and of Main Bioconversion Technologies for Production of Biofuels’, *Applied Microbiology and Biotechnology*, 96(3), pp. 631–645. doi: 10.1007/s00253-012-4398-0.
- Marshall, J. A., Nichols, P. D. and Hallegraeff, G. M. (2002) ‘Chemotaxonomic Survey of Sterols and Fatty acids in Six Marine Raphidophyte Algae’, *Journal of Applied Phycology*, 14(4), pp. 255–265. doi: 10.1023/A:1021101203543.
- Mata, T. M., Martins, A. A. and Caetano, N. S. (2010) ‘Microalgae for Biodiesel Production and Other Applications: A Review’, *Renewable and Sustainable Energy Reviews*, 14(1), pp. 217–



232. doi: 10.1016/j.rser.2009.07.020.

Matero, S. (2010) *Chemometric Methods in Pharmaceutical Tablet Development and Manufacturing Unit*.

Matos, J. et al. (2019) 'Investigation of Nutraceutical Potential of the Microalgae *Chlorella vulgaris* and *Arthrospira platensis*', *International Journal of Food Science and Technology*, 55(1), pp. 303–312. doi: 10.1111/ijfs.14278.

Mayasari, E., Raya, I. and Natsir, H. (2012) 'The Effect of Fe²⁺ and Mn²⁺ Ions Toward β-carotene Productivity by Phytoplankton *Isochrysis aff galbana* (T-iso)', *Marina Chimica Acta*, 13(2), pp. 7–12.

Melanie, S. and Fitriani, D. (2019) 'Combination of Cell Disruption Method and pH Variation as Pre-Treatment for Lipid Extraction of *Nannochloropsis* sp.', *IOP Conference Series: Earth and Environmental Science*, 404(1). doi: 10.1088/1755-1315/404/1/012022.

Mengist, W., Soromessa, T. and Legese, G. (2020) 'Method for Conducting Systematic Literature Review and Meta-Analysis for Environmental Science Research', *MethodsX*. Elsevier B.V., 7, p. 100777. doi: 10.1016/j.mex.2019.100777.

Midway, S. R. (2020) 'Principles of Effective Data Visualization', *Patterns*. The Author(s), p. 100141. doi: 10.1016/j.patter.2020.100141.

Milledge, J. J. (2011) 'Commercial Application of Microalgae Other Than as Biofuels: A Brief Review', *Reviews in Environmental Science and Biotechnology*, 10(1), pp. 31–41. doi: 10.1007/s11157-010-9214-7.

Moher, D. et al. (2010) 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement', *International Journal of Surgery*, 8(5), pp. 336–341. doi: 10.1016/j.ijsu.2010.02.007.

Mohsenpour, S. F., Richards, B. and Willoughby, N. (2012) 'Spectral Conversion of Light for Enhanced Microalgae Growth Rates and Photosynthetic Pigment Production', *Bioresource Technology*. Elsevier Ltd, 125, pp. 75–81. doi: 10.1016/j.biortech.2012.08.072.

Molino, A. et al. (2018) 'Microalgae Characterization for Consolidated and New Application in Human Food, Animal Feed and Nutraceuticals', *International Journal of Environmental Research and Public Health*, 15(11), pp. 1–21. doi: 10.3390/ijerph15112436.

Mubarok, A., Setyaningsih, I. and Uju, U. (2018) 'Karakteristik Eksopolisakarida Mikroalga Porphyridium cruentum yang Berpotensi untuk Produksi Bioetanol', *Jurnal Pengolahan Hasil Perikanan Indonesia*, 21(1), p. 24. doi: 10.17844/jphpi.v21i1.21258.

Munawaroh, H. S. H. et al. (2018) 'Characterization of Phycocyanin from Spirulina fusiformis and its Thermal Stability', *Journal of Physics: Conference Series*, 1013(1). doi: 10.1088/1742-6596/1013/1/012205.

Munawaroh, H. S. H. et al. (2019) 'Characterization and Physicochemical Properties of Chlorophyll Extract from Spirulina sp.', *Journal of Physics: Conference Series*, 1280(2). doi: 10.1088/1742-



6596/1280/2/022013.

- Munawaroh, H. S. H. *et al.* (2020) ‘Photostabilization of Phycocyanin from Spirulina platensis Modified by Formaldehyde’, *Process Biochemistry*, 94(April), pp. 297–304. doi: 10.1016/j.procbio.2020.04.021.
- Muqith, A. (2013) ‘Diatoms Use and Effectiveness of Feed Larvae Brachionus plicatilis Milkfish’, 4(2), pp. 61–66.
- Musdalifah, Rustam, Y. and Amini, S. (2015) ‘Kultivasi dan Ekstraksi Minyak dari Mikroalga Botryococcus braunii dan Nannochloropsis sp.’, *Bioma*, 11(2), p. 98. doi: 10.21009/bioma11(2).1.
- Nadif, M. and Govaert, G. (2010) ‘Cluster Analysis’, *Data Analysis*, pp. 215–255. doi: 10.1002/9780470611777.ch7.
- Nakamura, Y. *et al.* (2005) ‘Some Cyanobacteria Synthesize Semi-Amylopectin Type α-polyglucans Instead of Glycogen’, *Plant and Cell Physiology*, 46(3), pp. 539–545. doi: 10.1093/pcp/pci045.
- Neilson, J. and Wright, J. (2017) ‘The State and Food Security Discourses of Indonesia: Feeding The Bangsa’, *Geographical Research*, 55(2), pp. 131–143. doi: 10.1111/1745-5871.12210.
- Niccolai, A. *et al.* (2019) ‘Microalgae of interest as food source: Biochemical composition and digestibility’, *Algal Research*, 42(July). doi: 10.1016/j.algal.2019.101617.
- Norbawa, P. and Yudiat, E. (2013) ‘Pengaruh Perbedaan Periode Aerasi Karbondioksida terhadap Laju Pertumbuhan dan Kadar Total Lipid pada Kultur Nannochloropsis oculata’, *Journal of Marine Research*, 2, pp. 6–14.
- Noriko, N., Prayitno, J. and Anggraini, B. (2015) ‘Effects of Nitrate and Salinity on Fatty Acid Composition of Marine Tetraselmis sp.: Potential as Biodiesel’, *Makara Journal of Science*, 19(1), pp. 19–26. doi: 10.7454/mss.v19i1.4478.
- Notonegoro, H., Setyaningsih, I. and Tarman, K. (2018) ‘Kandungan Senyawa Aktif Spirulina platensis yang Ditumbuhkan pada Media Walne dengan Konsentrasi NaNO₃Berbeda’, *Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan*, 13(2), p. 111. doi: 10.15578/jpbkp.v13i2.555.
- Novianti, T. (2019) ‘Kandungan Betakaroten Kultur Mikroalga (Chlorella vulgaris) dengan Perbedaan Sumber Cahaya dan Kepadatan Awal Inokulum’, 3, pp. 62–71.
- Nugroho, R. A., Subagyono, D. J. N. and Arung, E. T. (2020) ‘Isolation and Characterization of Botryococcus braunii From a Freshwater Environment in Tenggarong, Kutai Kartanegara, Indonesia’, *Biodiversitas*, 21(5), pp. 2331–2336. doi: 10.13057/biodiv/d210565.
- Nugroho, W. A. *et al.* (2015) ‘Effect of Growth Promoting Bacteria on the Growth Rate and Lipid Content of Microalgae Chlorella sp in Sludge Liquor of Anaerobic Digester of Dairy Manure’, *International Journal on Advanced Science, Engineering and Information Technology*, 5(5), pp. 374–378. doi: 10.18517/ijaseit.5.5.586.



- Nur, M. M. A. (2014a) 'Efek Bikarbonat, Besi, dan Garam terhadap Produktivitas Lipid Chlorella sp. yang Diekstrak dengan Metode Osmotic Shock', *Eksperi*, 11(02), pp. 20–24.
- Nur, M. M. A. (2014b) 'Potency of Microalgae as Source of Functional Food in Indonesia (Overview)', *Eksperi*, 11(2), pp. 1–6.
- Nurmalitasari, E. and Ridlo, A. (2014) 'Injeksi Karbodioksida (CO₂) Pada Media Pemeliharaan Terhadap Biomassa dan Kandungan Total Lipid Mikroalga Tetraselmis chuii', *Diponegoro Journal of Marine Research*, 3(3), pp. 388–394. doi: 10.14710/jmr.v3i3.6013.
- Nurul Mutmainnah, Risjani, Y. and Hertika, A. M. S. (2018) 'Growth Rate and Chemical Composition of Secondary Metabolite Extracellular Polysaccharide (EPS) in Microalga Porphyridium cruentum', *The Journal of Experimental Life Sciences*, 8(2), pp. 97–102. doi: 10.21776/ub.jels.2018.008.02.05.
- Ochthreeani, A. M. and Soedarsono, P. (2014) 'Pengaruh Perbedaan Jenis Pupuk terhadap Pertumbuhan Nannochloropsis sp. dilihat Dari Kepadatan Sel dan Klorofil a pada Skala Semi Massal', 3(2), pp. 102–108.
- Odjadjare, E.C., Mutanda, T. and Olaniran, A. O. (2017) 'Potential Biotechnological Application of Microalgae: a Critical Review', *Critical Reviews in Biotechnology*, 37(1), pp. 37–52. doi: 10.3109/07388551.2015.1108956.
- Oktaviani, D., Adisyahputra and Amelia, N. (2017) 'Pengaruh Kadar Nitrat Terhadap Pertumbuhan dan Kadar Lipid Mikroalga Melosira sp. Sebagai Tahap Awal Produksi Biofuel', *Jurnal Risetologi KPM UNJ*, 2(1), pp. 1–13.
- Oktora, A. R., Ma'ruf, W. F. and Agustini, T. W. (2016) 'Fixings Agent Effect to β-carotene Stability of Crude Extract from Dunaliella salina Microalga at Different Temperature Condition', *Jurnal Pengolahan Hasil Perikanan Indonesia*, 19(3), pp. 206–213. doi: 10.17844/jphpi.2016.19.3.206.
- Ortega-Martorell, S. et al. (2016) 'Pattern Recognition Analysis of MR Spectra', *eMagRes*, 5(1), pp. 945–958. doi: 10.1002/9780470034590.emrs tm1484.
- Ortiz Montoya, E. Y. et al. (2014) 'Production of Chlorella vulgaris as a Source of Essential Fatty Acids in a Tubular Photobioreactor Continuously Fed with Air Enriched With CO₂ at Different Concentrations', *Biotechnology Progress*, 30(4), pp. 916–922. doi: 10.1002/btpr.1885.
- Palmucci, M. and Giordano, M. (2012) 'Is Cell Composition Related to the Phylogenesis of Microalgae? An Investigation Using Hierarchical Cluster Analysis of Fourier Transform Infrared Spectra of Whole Cells', *Environmental and Experimental Botany*. Elsevier B.V., 75, pp. 220–224. doi: 10.1016/j.envexpbot.2011.07.005.
- Pangestuti, R. (2017) *Mikroalga Koleksi P2O LIPI untuk Nutraceutikal Masa Depan*, Pusat Penelitian Oseanografi LIPI. Available at: <http://www.albayan.ae>.
- Panggabean, L. M. G. (2007) 'Koleksi Kultur Mikroalga', *Oseana*, 32(2), pp. 11–20. Available at: www.oseanografi.lipi.go.id.



- Panggabean, L. M. G. *et al.* (2013) 'Triglyceride Composition of Sixteen Strains of Marine Diatom', *Jurnal Ilmu dan Teknologi Kelautan Tropis*, 5(1), pp. 162–169. doi: 10.29244/jitkt.v5i1.7762.
- Park, C. H. and Lee, M. (2008) 'On Applying Linear Discriminant Analysis for Multi-Labeled Problems', *Pattern Recognition Letters*, 29(7), pp. 878–887. doi: 10.1016/j.patrec.2008.01.003.
- Paul, L. C., Suman, A. Al and Sultan, N. (2013) 'Methodological Analysis of Principal Component Analysis (PCA) Method', *IJCEM International Journal of Computational Engineering & Management ISSN*, 16(2), pp. 2230–7893. Available at: www.IJCEM.org%0Awww.IJCEM.org.
- Pelah, D., Sintov, A. and Cohen, E. (2004) 'The Effect of Salt Stress on The Production of Canthaxanthin and Astaxanthin by Chlorella zofingiensis Grown Under Limited Light Intensity', *World Journal of Microbiology and Biotechnology*, 20(5), pp. 483–486. doi: 10.1023/B:WIBI.0000040398.93103.21.
- Pikoli, M. R. *et al.* (2019) 'Characteristics of Tropical Freshwater Microalgae Micractinium conductrix, Monoraphidium sp. and Choricystis parasitica, and Their Potency as Biodiesel Feedstock', *Heliyon*. Elsevier Ltd, 5(12), p. e02922. doi: 10.1016/j.heliyon.2019.e02922.
- Poerschmann, J., Spijkerman, E. and Langer, U. (2004) 'Fatty Acid Patterns in Chlamydomonas sp. as a Marker for Nutritional Regimes and Temperature Under Extremely Acidic Conditions', *Microbial Ecology*, 48(1), pp. 78–89. doi: 10.1007/s00248-003-0144-6.
- Pongswatd, S. and Smerpitak, K. (2018) 'Applying Radar Chart for Process Control Behavior', 2018 3rd International Conference on Control and Robotics Engineering, ICCRE 2018. IEEE, pp. 90–93. doi: 10.1109/ICCRE.2018.8376440.
- Pradana, Y. S. *et al.* (2017) 'Oil Algae Extraction of Selected Microalgae Species Grown in Monoculture and Mixed Cultures for Biodiesel Production', *Energy Procedia*. The Author(s), 105, pp. 277–282. doi: 10.1016/j.egypro.2017.03.314.
- Prafanda, A., Julyantoro, P. G. S. and Wijayanti, N. P. P. (2020) 'Quality of Chaetoceros calcitrans Cultured with Different Concentrations of Potassium Nitrate (KNO₃)', *Advances in Tropical Biodiversity and Environmental Sciences*, 4(1), p. 5. doi: 10.24843/atbes.2020.v04.i01.p02.
- Praharyawan, S., Rahman, D. Y. and Susilaningsih, D. (2020) 'The Enhancement of Growth, Biomass Production and Lipid Productivity of Microalgae Choricystis sp. LBB13-AL045 by the Addition of Hot Water Extract of Its Dried Biomass', *IOP Conference Series: Earth and Environmental Science*, 457(1). doi: 10.1088/1755-1315/457/1/012071.
- Praharyawan, S., Yunita Rahman, D. and Susilaningsih, D. (2018) 'Influence of Light Intensity on Lipid Productivity and Fatty Acids Profile of Choricystis sp. LBB13-AL045 for Biodiesel Production', *Research Journal of Life Science*, 5(2), pp. 128–139. doi: 10.21776/ub.rjls.2018.005.02.7.
- Partono, T., Kawaroe, M. and Katili, V. (2013) 'Fatty Acid Composition of Three Diatom Species Skeletonema costatum, Thalassiosira sp. and Chaetoceros gracilis', *International Journal of*



Environment and Bioenergy, 6(1), pp. 28–43.

- Prasetyo, H., Setyaningsih, I. and Ratih Agungpriyono, D. (2015) ‘Growth and Extracellular Polysaccaride Production of Porphyridiumcruentum In Various Photoperiod’, *Jphpi 2015*, 18(2). doi: 10.17844/jphpi.2015.18.2.219.
- Priatni, S. *et al.* (2016) ‘Antidiabetic Screening of Some Indonesian Marine Cyanobacteria Collection’, *Biodiversitas*, 17(2), pp. 642–646. doi: 10.13057/biodiv/d170236.
- Priatni, S. *et al.* (2018) ‘Phycobiliproteins Production and Heavy Metals Reduction Ability of Porphyridium sp.’, *IOP Conference Series: Earth and Environmental Science*, 160(1). doi: 10.1088/1755-1315/160/1/012006.
- Prihantini, N. B. *et al.* (2016) ‘The Effect of Temperature on The Growth of Genus Synechococcus Isolated From Four Indonesian Hot Springs and Agathis Small Lake of Universitas Indonesia’, *AIP Conference Proceedings*, 1729. doi: 10.1063/1.4946966.
- Prihantini, N. B., Anggriary, R. D. and Kusmadji, L. R. (2020) ‘The Growth of Synechococcus sp RDB001 at Temperature of $30\pm5^{\circ}\text{C}$ and $50\pm5^{\circ}\text{C}$: A Comparison Study of Cell Density and Chlorophyll Content’, *Journal of Physics: Conference Series*, 1442(1). doi: 10.1088/1742-6596/1442/1/012065.
- Priscilla de Souza, M. *et al.* (2020) ‘Concepts and Trends for Extraction and Application of Microalgae Carbohydrates’, *Microalgae - From Physiology to Application*, pp. 1–13. doi: 10.5772/intechopen.89323.
- Pulz, O. and Gross, W. (2004) ‘Valuable Products from Biotechnology of Microalgae’, *Applied Microbiology and Biotechnology*, 65(6), pp. 635–648. doi: 10.1007/s00253-004-1647-x.
- Purba, E. and Siburan, K. (2012) ‘The Determination of Salinity and Nutrition (NaH_2PO_4) Profile in Nannochloropsis oculata Cultivation to Gain Maximum Lipid’, 14(2), p. 135. doi: 10.14710/reaktor.14.2.135-142.
- Purbonegoro, T. *et al.* (2018) ‘Toxicity of Copper (Cu) on the Growth and Chlorophyll-a Contents of Marine Microalgae Isochrysis sp.’, *AIP Conference Proceedings*, 2026. doi: 10.1063/1.5064967.
- Purkan, P. *et al.* (2019) ‘Biodiesel Production by Lipids from Indonesian Strain of Microalgae Chlorella vulgaris’, *Open Chemistry*, 17(1), pp. 919–926. doi: 10.1515/chem-2019-0102.
- Purwanti, A. (2015) ‘Pengaruh Proses Ekstraksi Bertekanan dalam Pengambilan Lipid dari Mikroalga Jenis Nannochloropsis sp. dengan Pelarut Metanol’, *TeknologiTechnoscientia*, 7(2), pp. 112–117.
- Puspitasari, R. *et al.* (2018) ‘Cu Toxicity on Growth and Chlorophyll-a of Chaetoceros sp.’, *IOP Conference Series: Earth and Environmental Science*, 118(1). doi: 10.1088/1755-1315/118/1/012061.
- Putalan, R. and Widiasuti, I. M. (2019) ‘Efek Fotoperiode Terhadap Kepadatan Seldan Kandungan Klorofil-a Chlorella sp. Skala Laboratorium’, *Agrisains*, 3(2019), pp. 106–111.



- Putri, T. W. *et al.* (2018) 'Chlorella sp: Extraction of Fatty Acid by Using Avocado Oil as Solvent and Its Application as an Anti-Aging Cream', *Journal of Physics: Conference Series*, 979(1). doi: 10.1088/1742-6596/979/1/012009.
- Rahaju, S. M. N. *et al.* (2013) 'Seleksi dan Karakterisasi Ganggang Mikro Indigen Air Tawar sebagai Penghasil Karbohidrat untuk Energi Terbarukan', *Limnotek*, 20(2), pp. 178–190.
- Rahmadi, A., Mulyani, Y. and Lewaru, M. W. (2020) 'Effect of Salinity Difference on Lipid Content from Chaetoceros muelleri on Continuous Reactors', *Advanced Journal of Graduate Research*, 7(1), pp. 3–10. doi: 10.21467/ajgr.7.1.3-10.
- Rahman, D. Y. *et al.* (2019) 'Morphology and Molecular Characterization of Newly Isolated Microalgae Strain Chlorella volutis LIPI13-WKT066 from Wakatobi Islands and its Potential Use', *Annales Bogorienses*, 23(1), p. 13. doi: 10.14203/ann.bogor.2019.v23.n1.13-19.
- Rahman, D. Y. *et al.* (2020) 'Enhancement of Lipid Production of Chlorella sp. 042 by Mutagenesis', *IOP Conference Series: Earth and Environmental Science*, 439(1). doi: 10.1088/1755-1315/439/1/012021.
- Rahmat, T. A., W.S., R. D. D. and Soetrisnanto, D. (2013) 'Kultivasi Botryococcus braunii Memanfaatkan Air Dadih (Whey) Tahu Sebagai Potensi Biodiesel', *Jurnal Teknologi Kimia Dan Industri*, 2(Volume 2, Nomor 4, Tahun 2013), pp. 72–83. Available at: <https://ejournal3.undip.ac.id/index.php/jtki/article/view/4022>.
- Rahmawati, S. I., Hidayatullah, S. and Suprayatmi, M. (2017) 'Ekstraksi Fikosianin Dari Spirulina Plantesis Sebagai Biopigmen Dan Antioksidan', *Jurnal Pertanian*, 8(1), p. 36. doi: 10.30997/jp.v8i1.639.
- Rao, A. R. *et al.* (2007) 'Effect of Salinity on Growth of Green Alga Botryococcus braunii and Its Constituents', *Bioresource Technology*, 98(3), pp. 560–564. doi: 10.1016/j.biortech.2006.02.007.
- Raven, J. A. (1984) 'A Cost-Benefit Analysis of Photon Absorption By Photosynthetic Unicells', *New Phytologist*, pp. 593–625. doi: 10.1111/j.1469-8137.1984.tb04152.x.
- Raya, I. (2015) 'The Chlorophyll Production and Hydrogen Produced Potency by Phytoplankton Chaetoceros calcitrans, Chlorella vulgaris, Dunaliella salina, and Porphyridium cruentum', 5(1), pp. 70–77.
- Raya, I. *et al.* (2016) 'Chorella vulgaris and Spirulina platensis : Concentration of Protein, Docosahexaenoic Acid (DHA), Eicosapentaenoic Acid (EPA) and Variation Concentration of Maltodextrin Via Microencapsulation Method', *International Journal of Applied Chemistry*, 12(4), pp. 539–548.
- Richardson, M. (2009) 'Principal Component Analysis', *Neural Networks for Signal Processing - Proceedings of the IEEE Workshop*, 1(May), pp. 289–298. doi: 10.1109/ICNNNSP.2009.5196122.
- Ridlo, A., Sedjati, S. and Supriyantini, E. (2016) 'Aktivitas Anti Oksidan Fikosianin Dari Spirulina Sp. Menggunakan Metode Transfer Elektron Dengan DPPH (1,1-difenil-2-pikrilhidrazil)',



Jurnal Kelautan Tropis, 18(2), pp. 58–63. doi: 10.14710/jkt.v18i2.515.

- Ridlo, A. and Widianingsih (2013) ‘Optimalisasi Total Lipid Mikroalga Porphyridiumcruentum Melalui Pembatasan Nutrien dan Fotoperiod’, *Buletin Oseanografi Marina*, 2(2), pp. 16–23. doi: 10.14710/buloma.v2i2.6932.
- Rinanti, A. et al. (2013) ‘Growth Response and Chlorophyll Content of *Scenedesmus obliquus* Cultivated in Different Artificial Media’, *Asian Journal of Environmental Biology*, 1(1), pp. 1–9.
- Rinanti, A. and Purwadi, R. (2019) ‘Increasing Carbohydrate and Lipid Productivity in Tropical Microalgae Biomass as a Sustainable Biofuel Feedstock’, *Energy Procedia*. ElsevierB.V, 158, pp. 1215–1222. doi: 10.1016/j.egypro.2019.01.310.
- Rinawati, M., Sari, L. A. and Pursetyo, K. T. (2020) ‘Chlorophyll and Carotenoids Analysis Spectrophotometer Using Method on Microalgae’, *IOP Conference Series: Earth and Environmental Science*, 441(1). doi: 10.1088/1755-1315/441/1/012056.
- Ringnér, M. (2008) ‘What is Principal Component Analysis?’, *Nature Biotechnology*, 26(3), pp. 303–304. doi: 10.1038/nbt0308-303.
- Roberts, J. J. and Cozzolino, D. (2016) ‘An Overview on the Application of Chemometrics in Food Science and Technology—An Approach to Quantitative Data Analysis’, *Food Analytical Methods*. Food Analytical Methods, 9(12), pp. 3258–3267. doi: 10.1007/s12161-016-0574-7.
- Rodolfi, L. et al. (2009) ‘Microalgae for Oil: Strain Selection, Induction of Lipid Synthesis and Outdoor Mass Cultivation in a Low-Cost Photobioreactor’, *BiotechnologyandBioengineering*, 102(1), pp. 100–112. doi: 10.1002/bit.22033.
- Romaidi et al. (2018) ‘Lipid Production from Tapioca Wastewater by Culture of *Scenedesmus* sp. with Simultaneous BOD, COD, and Nitrogen Removal’, *Journal of Physics: Conference Series*, 1025(1), pp. 3–9. doi: 10.1088/1742-6596/1025/1/012075.
- Rupaedah, B. and Takahashi, Y. (2017) ‘Effect of Nitrogen Supply in Culture Media and Light Intensity on Photosynthesis of *Chlamydomonas reinhardtii*’, *Biotechnologi & Biosains Indonesia*, 4(2), pp. 64–69.
- Saary, M. J. (2008) ‘Radar Plots: A Useful Way for Presenting Multivariate Health Care Data’, *Journal of Clinical Epidemiology*, 61(4), pp. 311–317. doi: 10.1016/j.jclinepi.2007.04.021.
- Sahu, A. et al. (2013) ‘Fatty Acids as Biomarkers of Microalgae’, *Phytochemistry*. Elsevier Ltd, 89, pp. 53–58. doi: 10.1016/j.phytochem.2013.02.001.
- Salim, Mohamad Agus (2013a) ‘Heterotrophic Growth of *Ankistrodesmus* sp. for Lipid Production Using Cassava Starch Hydrolysate as a Carbon Source’, *The International Journal of Biotechnology*, 2(1), pp. 42–51.
- Salim, M. Agus (2013) ‘Penggunaan Limbah Cair Tahu Untuk Meningkatkan Pertumbuhan Dan Produksi Biodiesel Dari Mikroalga *Scenedesmus* Sp’, *Jurnal UIN SGD*, 7(1), pp. 82–98.
- Salim, Mohamad Agus (2013b) ‘The Growth of *Ankistrodesmus* sp. in Response to CO₂Induction’,



Journal of Asian Scientific Research, 3(1), pp. 75–84.

- Salim, M. A. (2015) ‘Kadar Lipid Scenedesmus sp. pada Kondisi Mikrotrof dan Penambahan Sumber Karbon dari Hidrolisat Pati Singkong’, *Journal Uinsg*, 9(2), p. 224.
- Salim, M. A., Yuniarti, Y. and Taufikurohman, O. (2013) ‘Production of Biodesel and Growth of *Staurastrum* sp. in Response to CO₂ Induction’, *Asian Journal of Agriculture and Rural Development*, 3(2), p. 67. Available at: <http://0-search.proquest.com.pugwash.lib.warwick.ac.uk/docview/1416187939?accountid=14888%5Cnhttp://webcat.warwick.ac.uk:4550/resserv??genre=article&issn=&title=Asian+Journal+of+Agriculture+and+Rural+Development&volume=3&issue=2&date=2013-02-01&atitle=Pro>.
- Santos-Sánchez, N. F. et al. (2016) ‘Lipids Rich in ω-3 Polyunsaturated Fatty Acids from Microalgae’, *Applied Microbiology and Biotechnology*. Applied Microbiology and Biotechnology, 100(20), pp. 8667–8684. doi: 10.1007/s00253-016-7818-8.
- Saputro, B. R. et al. (2015) ‘The Growth of *Botryococcus braunii* Microalgae As a Lipid Producer in a Mixed Medium of Coconut Water and Seawater’, *Jurnal Sains Dan Matematika*, 23(4), pp. 94–100.
- Saputro, T. B. et al. (2019) ‘Isolation of High Lipid Content Microalgae From Wonorejo River, Surabaya, Indonesia and Its Identification Using rbcL Marker Gene’, *Biodiversitas*, 20(5), pp. 1380–1388. doi: 10.13057/biodiv/d200530.
- Sari, A. M., Hendrawati, T. Y. and Erdawati (2018) ‘The Effect of Zinc Phosphate for Enhanced Chlorophyll and Carotenoid Production by Cultivation of Algae Using Tofu Wastewater’, *AIP Conference Proceedings*, 2049(December). doi: 10.1063/1.5082476.
- Sari Afriani, Uju and Setyaningsih, I. (2018) ‘Komposisi Kimia Spirulina plantesis yang Dikultivasi dalam Fotobioreaktor dengan Fotoperiode Berbeda’, *Jurnal Pengolahan Hasil Perikanan Indonesia*, 21(3), pp. 471–479.
- Sari, L. A., Masithah, E. D. and Alamsjah, M. A. (2018) ‘Efektivitas Karotenoid Spirulina platensis Dikultur dari Ampas Kecap sebagai Antioksidan’, *Journal of Fisheries and Marine Research*, 2(1), pp. 9–14.
- Sathasivam, R. et al. (2019) ‘Microalgae Metabolites: A Rich Source for Food and Medicine’, *Saudi Journal of Biological Sciences*. King Saud University, 26(4), pp. 709–722. doi: 10.1016/j.sjbs.2017.11.003.
- Sedjati, S. et al. (2012) ‘Profile of Polar and Non-Polar Pigment from Marine Microalgae *Spirulina* sp. and Their Potential as Natural Coloring’, *Ilmu Kelautan*, 17(3), pp. 5–8.
- Sedjati, S. et al. (2019) ‘Chlorophyll and Carotenoid Content of *Dunaliella salina* at Various Salinity Stress and Harvesting Time’, *IOP Conference Series: Earth and Environmental Science*, 246(1). doi: 10.1088/1755-1315/246/1/012025.
- Sedjati, S., Ridlo, A. and Supriyantini, E. (2016) ‘Efek Penambahan Gula Terhadap Kestabilan Warna Ekstrak Fikosianin *Spirulina* sp.’, *Jurnal Kelautan Tropis*, 18(1), pp. 1–6. doi:



10.14710/jkt.v18i1.505.

- Senjaya, F. A. *et al.* (2017) 'Pengaruh Laju Alir Nitrogen Pada Metode Starvasi Nitrogen Terhadap Peningkatan Kandungan Lipid Mikroalga Chlorella sp. Sebagai Bahan Baku Biodiesel', *BIOMA Jurnal Ilmiah Biologi*, 6(2), pp. 21–28. doi: 10.26877/biomia.v6i2.1714.
- Setyaningsih, E. P. *et al.* (2017) 'Total Lipid and Morphology Microalgae Skeletonema costatumon Nitrogen Nutrition Physiological Stress', 8(1), pp. 187–190.
- Setyaningsih, I. *et al.* (2014) 'Effect of Harvest Periods and Media Nutrition on Spirulina platensis Biopigment', 16.
- Setyaningsih, I., Nurhayati, T. and Aremhas, U. (2013) 'Pengaruh Media Kultivasi Chaetoceros gracilis Terhadap Kandungan Kimia dan Potensi Inhibitor Protease', *Jurnal Teknologidan Industri Pangan*, 24(2), pp. 222–227. doi: 10.6066/jtip.2013.24.2.222.
- Setyaningsih, I. and Saputra, A. T. (2011) 'Komposisi Kimia dan Kandungan Pigmen Spirulina fusiformis pada Umur Panen yang Berbeda dalam Media Pupuk', *Jurnal Pengolahan Hasil Perikanan Indonesia*, 14(1), pp. 63–69. doi: 10.17844/jphpi.v14i1.3430.
- Singh, J. and Saxena, R. C. (2015) 'An Introduction to Microalgae: Diversity and Significance', *Handbook of Marine Microalgae: Biotechnology Advances*, pp. 11–24. doi: 10.1016/B978-0-12-800776-1.00002-9.
- Sioen, I. *et al.* (2011) 'Consumption of Plant Sterols in Belgium: Estimated Intakes and Sources of Naturally Occurring Plant Sterols and β-carotene', *British Journal of Nutrition*, 105(6), pp. 960–966. doi: 10.1017/S0007114510004587.
- Siqueira, S. F. *et al.* (2018) 'Introductory Chapter: Microalgae Biotechnology - A Brief Introduction', *Microalgal Biotechnology*, pp. 1–12. doi: 10.5772/intechopen.73250.
- Sjahrul, M., Artati and Raya, I. (2014) 'Additional Study on Mg²⁺ Micro Nutrient Phytoplankton Porpyridium cruentum and Tetraselmis chuii for Chlorophyll and Protein Production', *Research Journal of Science & IT Management*, 3(8), pp. 9–17.
- Sobari, R. *et al.* (2013) 'Kandungan Lipid Beberapa Jenis Sianobakteria Laut Sebagai Bahan Sumber Penghasil Biodiesel', *Marine Research*, 2(1), pp. 112–119.
- Solovchenko, A. E. *et al.* (2008) 'Effects of Light Intensity and Nitrogen Starvation on Growth, Total Fatty Acids and Arachidonic Acid in The Green Microalga *Parietochloris incisa*', *Journal of Applied Phycology*, 20(3), pp. 245–251. doi: 10.1007/s10811-007-9233-0.
- Spolaore, P. *et al.* (2006) 'Commercial Applications of Microalgae', *Journal of Bioscience and Bioengineering*, 101(2), pp. 87–96. doi: 10.1263/jbb.101.87.
- Suantika, G., Putri, A. D., *et al.* (2016) 'Impact of Salinity and Light Intensity Stress on B Vitamins Content in Marine Diatom *Skeletonema costatum*', *Journal of Fisheries and Aquatic Science. Science Alert*, 12(1), pp. 22–28. doi: 10.3923/jfas.2017.22.28.
- Suantika, G., Muhammad, H., *et al.* (2016) 'The Use of Cyanobacteria *Arthrospira platensis* and Cladoceran *Daphnia magna* as Complementary Protein and Lipid Sources in Transitional Diet'



- for Common Carp *Cyprinus carpio* L. Nursery', *Natural Resources*, 07(07), pp. 423–433. doi: 10.4236/nr.2016.77037.
- Sudhakar, M. P. et al. (2019) 'A Review on Bioenergy and Bioactive Compounds From Microalgae and Macroalgae-Sustainable Energy Perspective', *Journal of Cleaner Production*. Elsevier Ltd, 228, pp. 1320–1333. doi: 10.1016/j.jclepro.2019.04.287.
- Sugiati, N. et al. (2019) 'The Increase in β-carotene Content in *Dunaliella salina* from the Application of Different Light Intensities', *IOP Conference Series: Earth and Environmental Science*, 236(1). doi: 10.1088/1755-1315/236/1/012001.
- Sui, Y. et al. (2020) 'Harvesting Time and Biomass Composition Affect the Economics of Microalgae Production', *Journal of Cleaner Production*. Elsevier Ltd, 259, p. 120782. doi: 10.1016/j.jclepro.2020.120782.
- Sukadarti, S., Wahyu Murni, S. and Azimatun Nur, M. M. (2016) 'Peningkatan Phycocyanin pada Spirulina Platensis dengan Media Limbah Virgin Coconut Oil pada Photobioreactor Ter tutup', *Eksbergi*, 13(2), p. 1. doi: 10.31315/e.v13i2.1700.
- Sukardi, P. et al. (2019) 'Effect of Land Agricultural Fertilizer on Growth of Marine Single Cell Protein, *Spirulina platensis*, *Chlorella vulgaris* and *Nannochlorophysis*', *Omni-Akuatika*, 15(2), pp. 69–74.
- Sukardi, P., Winanto, T. and Pramono, T. B. (2014) 'Microencapsulation of Single-Cell Protein from Various Microalgae Species', *Jurnal Akuakultur Indonesia* 13 (2), 115–119 (2014) Artikel, 13(2), pp. 115–119.
- Sukarni et al. (2014) 'Potential and Properties of Marine Microalgae *Nannochloropsis oculata* as Biomass Fuel Feedstock', *International Journal of Energy and Environmental Engineering*, 5(4), pp. 279–290. doi: 10.1007/s40095-014-0138-9.
- Sukarni, S. et al. (2018) 'Exploring the Prospect of Marine Microalgae *Isochrysis galbana* as Sustainable Solid Biofuel Feedstock', *Journal of Applied Research and Technology*, 16(1), pp. 53–66. doi: 10.22201/icat.16656423.0.16.1.703.
- Supriyantini, E. (2013) 'Pengaruh Salinitas terhadap Kandungan Nutrisi *Skeletonema costatum*', *Buletin Oseanografi Marina*, 2(1), pp. 51–57. doi: 10.14710/buloma.v2i1.6927.
- Susanti, H. et al. (2014) 'Cultivation of Filamentous Cyanobacteria for Valuable Bioproduct Using Sago Solid Waste As Substrates', 37(1), pp. 18–25.
- Susilaningsih, D. et al. (2020) 'Stability of Phycocyanin Extracted from *Spirulina maxima* in different pH from Indoor and Semioutdoor Cultivation', *Journal of Microbial Systematics and Biotechnology*, 2(1), pp. 1–9. doi: 10.37604/jmsb.v2i1.33.
- Suyono, E. A. et al. (2016) 'The Effect of Nitrogen Stress in Medium for Increasing Carbohydrate as a Bioethanol Source and Carotenoid as an Antioxidant From *Chlorella zofingiensis* Culture', *ARPN Journal of Engineering and Applied Sciences*, 11(4), pp. 2698–2701.
- Syaichurrozi, I. and Jayanudin, J. (2017) 'Effect of Tofu Wastewater Addition on the Growth and



- Carbohydrate-Protein-Lipid Content of *Spirulina platensis*', *International Journal of Engineering, Transactions B: Applications*, 30(11), pp. 1631–1638. doi: 10.5829/ije.2017.30.11b.02.
- Takagi, M., Karseno and Yoshida, T. (2006) 'Effect of Salt Concentration on Intracellular Accumulation of Lipids and Triacylglyceride in Marine Microalgae Dunaliella Cells', *Journal of Bioscience and Bioengineering*, 101(3), pp. 223–226. doi: 10.1263/jbb.101.223.
- Tang, D. Y. Y. et al. (2020) 'Potential Utilization of Bioproducts From Microalgae for the Quality Enhancement of Natural Products', *Bioresource Technology*. Elsevier, 304(January), p.122997. doi: 10.1016/j.biortech.2020.122997.
- Tarento, T. D. C. et al. (2018) 'Microalgae as a Source of Vitamin K1', *Algal Research*. Elsevier, 36(June), pp. 77–87. doi: 10.1016/j.algal.2018.10.008.
- Tasman, A. M., Dharma, A. and Syfrizayanti (2019) 'Isolasi dan Identifikasi Spesies Mikroalga Air Tawar sebagai Antioksidan dan Antihiperlikemik', *Jurnal Litbang Industri*, 9, pp. 119–126.
- Taufikurahman, T. and Shafira, H. (2018) 'Comparison Between Chlorella vulgaris and Chlorella pyrenoidosa in Biomass and Protein Content, Cultivated in Bioslurry and Grown Under Various LED', (December), pp. 0–7.
- Taufiqurrahmi, N. et al. (2017) 'Phycocyanin Extraction in Spirulina Produced Using Agricultural Waste', *IOP Conference Series: Materials Science and Engineering*, 206(1). doi: 10.1088/1757-899X/206/1/012097.
- Tawfik, G. M. et al. (2019) 'A Step by Step Guide for Conducting a Systematic Review and Meta-Analysis With Simulation Data', *Tropical Medicine and Health*. Tropical Medicine and Health, 47(1), pp. 1–9. doi: 10.1186/s41182-019-0165-6.
- Technologies, S. (2013) 'Discriminant Analysis', pp. 1–16.
- Technologies, S. (2020) 'Radar/ Spider Plot', pp. 1–6.
- Templeton, D. W. et al. (2012) 'Separation and Quantification of Microalgal Carbohydrates', *Journal of Chromatography A*. Elsevier B.V., 1270, pp. 225–234. doi: 10.1016/j.chroma.2012.10.034.
- Tharwat, A. (2016) 'Principal Component Analysis - A Tutorial', *International Journal of Applied Pattern Recognition*, 3(3), p. 197. doi: 10.1504/ijapr.2016.10000630.
- Tibbetts, S. M., Milley, J. E. and Lall, S. P. (2015) 'Chemical Composition and Nutritional Properties of Freshwater and Marine Microalgal Biomass Cultured in Photobioreactors', *Journal of Applied Phycology*, 27(3), pp. 1109–1119. doi: 10.1007/s10811-014-0428-x.
- Torres-Tiji, Y., Fields, F. J. and Mayfield, S. P. (2020) 'Microalgae as a Future Food Source', *Biotechnology Advances*, 41(August 2019). doi: 10.1016/j.biotechadv.2020.107536.
- Tugiyono et al. (2018) 'Test of Protein Content in *Nannochloropsis* sp. Lampung Mangrove Center Isolate on Intermediat Scale Culture'.
- Udiarta, P., Dewi, E. N. and Romadhon (2015) 'The Effect Addition of Stabilizer MgCO₃ and ZnCl₂



- on The Color Stability of Chlorophyll Pigment Content Microalgae *Spirulinaplatensis*', *Saintek Perikanan : Indonesian Journal of Fisheries Science and Technology*, 10(2), pp.114–118.doi: 10.14710/ijfst.10.2.114-118.
- Ulya, S., Sedjati, S. and Yudiaty, E. (2018) 'Kandungan Protein *Spirulina platensis* Pada Media Kultur Dengan Konsentrasi Nitrat (KNO₃) yang Berbeda', *Buletin Oseanografi Marina*,7(2), p. 98. doi: 10.14710/buloma.v7i2.20109.
- Usman, H. (2013) 'Pemanfaatan Medium Ars-Chat Pada Produksi Biomassa Fitoplankton Laut Yang Potensial Sebagai Bahan Baku Biofuel Jenis Bioetanol', pp. 352–365.
- Uyaguri-Diaz, M. I. et al. (2016) 'A Comprehensive Method for AmpliconbasedandMetagenomic Characterization of Viruses, Bacteria, and Eukaryotes in Freshwater Samples', *Microbiome*. *Microbiome*, 4, pp. 1–19. doi: 10.1186/s40168-016-0166-1.
- Varitha, A. et al. (2013) 'Isolation Oil Producing Microalgae *Chlamydomonas snowii* from Tropical Fresh Water, Indonesia', *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 4(4), pp. 1462–1470.
- Vaz, B. da S. et al. (2016) 'Microalgae as a New Source of Bioactive Compounds in Food Supplements', *Current Opinion in Food Science*. Elsevier Ltd, 7(2016), pp. 73–77. doi: 10.1016/j.cofs.2015.12.006.
- Volkman, J. K. (2003) 'Sterols in Microorganisms', *Applied Microbiology and Biotechnology*,60(5), pp. 495–506. doi: 10.1007/s00253-002-1172-8.
- Volkman, J. K. and Brown, M. R. (2006) 'Nutritional Value of Microalgae and Applications', *Algal cultures, analogues of blooms and applications*. Science Publishers Inc New Hampshire , (JANUARY 2005), pp. 407–457.
- Wachda et al. (2019) 'Production of Antioxidant C-Phycocyanin Using Extraction Process of *Spirulina platensis* in Large Scale Industry', *IOP Conference Series: Materials Science and Engineering*, 633(1). doi: 10.1088/1757-899X/633/1/012025.
- Wahyu, D., Hindarti, D. and Permana, R. (2020) 'Cadmium Toxicity Towards Marine Diatom *Thalassiosira* sp . and its Alteration on Chlorophyll-a and Carotenoid Content', *International Scientific Journal*, 31(April),pp. 48–57.
- Wahyuni, N., Rahardja, B. S. and Azhar, H. (2019) 'The Effect of Giving Combination Concentration of Leaves of *Moringa oleifera* with Walne Fertilizer in Culture Media on the Growth and Content of Carotenoids in *Dunaliella salina*', *Aquaculture Science*, 4(1),pp.37–49.
- Wang, C. Y., Fu, C. C. and Liu, Y. C. (2007) 'Effects of Using Light-Emitting Diodes on the Cultivation of *Spirulina platensis*', *Biochemical Engineering Journal*, 37(1), pp. 21–25. doi: 10.1016/j.bej.2007.03.004.
- Wati, A. and Motto, S. A. (2011) 'Ekstraksi Minyak dari Mikroalga Jenis *Chlorella* sp. Berbantuan Ultrasonik', 8, pp. 1–7.
- Wicaksono, H. A., Satyantini, W. H. and Masithah, E. D. (2019) 'The Spectrum of Light and



- Nutrients Required to Increase the Production of Phycocyanin *Spirulina platensis*', *IOP Conference Series: Earth and Environmental Science*, 236(1). doi: 10.1088/1755-1315/236/1/012008.
- Widianingsih *et al.* (2011) 'Kajian Kadar Total Lipid dan Kepadatan *Nitzschia* sp. yang Dikultur dengan Salinitas yang Berbeda', 3, pp. 29–37.
- Widianingsih *et al.* (2012) 'Kandungan Lipid Total *Nannochloropsis oculata* Pada Kulturdengan Berbagai Fotoperiod', *Jurnal Ilmu Kelautan*, 17(September), pp. 119–124. Available at: <http://ejournal.undip.ac.id/index.php/ijms/article/viewFile/4688/4247>.
- Widiyanto, S. *et al.* (2018) 'Biochemical Compounds and Sub-Chronic Toxicity Test of Chlorella sp. and Spirulina sp. Isolated from Glagah Coastal Water', *Spectrum*, 24(1).
- Widowati, I. *et al.* (2016) 'Antioxidant Activity of Three Microalgae Dunaliella salina, Tetraselmis chuii and Isochrysis galbana clone Tahiti', *Journal of Physics: Conference Series*, 755(1).doi: 10.1088/1742-6596/755/1/011001.
- Widyastuti, C. R. and Dewi, A. C. (2014) 'Sintesis Biodiesel dari Minyak Mikroalga Chlorella vulgaris dengan Reaksi Transesterifikasi Menggunakan Katalis KOH', *Jurnal Bahan Alam Terbarukan*, 3(1), pp. 29–33. doi: 10.15294/jbat.v3i1.3099.
- Wijanarko, B. and Putri, L. (2012) 'Ekstraksi Lipid dari Mikroalga (*Nannochloropsis* sp.) dengan Solven Methanol dan Chloroform', *Jurnal Teknologi Kimia dan Industri*, 1(1), pp. 130–138. Available at: <http://www.ejournal-s1.undip.ac.id/index.php/jtki/article/view/494>.
- Wulandari, R. (2019) 'Pengaruh Pemberian Variasi pH Terhadap Produksi Trigliserida Total dan Komposisi Asam Lemak dari Chlorella vulgaris Air Tawar', *Jurnal Riset Kimia*, 10(2), pp.66–74. doi: 10.25077/jrk.v10i2.316.
- Wyman, M., Gregory, R. P. F. and Carr, N. G. (1985) 'Novel Role for Phycoerythrin in Marine Cyanobacterium', *Science*, 230, pp. 4–6.
- Xin, L. *et al.* (2010) 'Effects of Different Nitrogen and Phosphorus Concentrations on the Growth, Nutrient Uptake, and Lipid Accumulation of a Freshwater Microalga *Scenedesmus* sp.', *Bioresource Technology*. Elsevier Ltd, 101(14), pp. 5494–5500. doi: 10.1016/j.biortech.2010.02.016.
- Yen, H. W. *et al.* (2013) 'Microalgae-Based Biorefinery - From Biofuels to Natural Products', *Bioresource Technology*. Elsevier Ltd, 135, pp. 166–174. doi: 10.1016/j.biortech.2012.10.099.
- Yim, O. and Ramdeen, K. T. (2015) 'Hierarchical Cluster Analysis: Comparison of Three Linkage Measures and Application to Psychological Data', *The Quantitative Methods for Psychology*, 11(1), pp. 8–21. doi: 10.20982/tqmp.11.1.p008.
- Yulina, Iba, W. and Hamzah, M. (2020) 'Pengaruh Konsentrasi Pupuk Organik Cair dari Eceng Gondok (*Eichhornia crassipes*) yang Berbeda Terhadap Pertumbuhan dan Kandungan Protein Chlorella vulgaris', *Jurnal Media Akuatika*, 5(1), pp. 34–42.
- Zhang, D., Jing, X.-Y. and Yang, J. (2011) 'Linear Discriminant Analysis', *Biometric Image*



UNIVERSITAS
GADJAH MADA

Metadata Analysis and Systematic Review of Phytochemical Composition and Factors Affecting The Phytochemical Levels for Microalgae

MARCELLA JESSICA, Dr. Widiasuti Setyaningsih, STP., M. Sc.; Indyaswan Tegar Suryaningtyas, S. Si., M.F.Sc.

Universitas Gadjah Mada, 2021 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Discrimination Technologies, pp. 27–33. doi: 10.4018/9781591408307.ch003.

Zio, M. Di *et al.* (2016) ‘Methodology for Data Validation 1.0’, (June), pp. 0–75. Available at:

https://ec.europa.eu/eurostat/cros/system/files/methodology_for_data_validation_v1.0_rev-2016-06_final.pdf.

Zullaikah, S. *et al.* (2019) ‘Lipids Extraction From Wet and Unbroken Microalgae *Chlorella vulgaris* Using Subcritical Water’, *Materials Science Forum*, 964 MSF, pp. 103–108. doi: 10.4028/www.scientific.net/MSF.964.103.