



DAFTAR PUSTAKA

- A'yun, S. N., J. Triastuti, and E. Saputra. 2021. Edible straw formulation from caragenant and gelatin as a solution in reducing plastic waste. IOP Conf. Series: Earth and Environmental Science. 718: 1-3.
- Adiandasari, J. Wusnah, dan Azhari. 2021. Pengaruh suhu dan waktu terhadap proses penyulingan minyak sereh wangi (*Cimnopogon nardus* L.). Chemical Engineering Journal Storage. 1(1): 22-28.
- Adicandra, R. M., dan T. Estiasih. 2016. Beras analog dari ubi kelapa putih (*Discorea alata* L.): kajian pustaka. Jurnal Pangan dan Agroindustri. 4 (1): 383-390.
- Adier, M. F. V., M. E. P. Sevilla, D. N. R. Valerio, and J. M. C. Ongpeng. 2023. Bamboo as sustainable building materials: a systematic review of properties, treatment methods, and standards. Buildings. 3: 1-36.
- Agudelo-Vera, C. M. Blokker, H. De Kater, and R. Lafort. 2017. Identifying (subsurface) anthropogenic heat sources that influence temperature in the drinking water distribution system. Drink. Water Eng. Sci. Discuss. 10: 83-91.
- Agustin, Y. E., dan K. S. Padmawijaya. 2016. Sintesis bioplastik dari kitosan-pati kulit pisang kepok dengan penambahan zat aditif. Jurnal Teknik Kimia. 10(2): 40-48.
- Agustina, E., R. Purnamasari, N. F. Erfansyah, F. Andiarna, N. Lusiana, dan I. Hidayah. 2024. Pemanfaatan limbah pucuk tebu sebagai sumber selulosa bahan baku plastik *biodegradable*. BIOTROPIC The Journal of Tropical Biology. 8(1): 39-54.
- Agustini T. A., W. Nurohman, D. P. K. Raharjo, I. Wijayanti, D. Romadhon, Widayat, and M. Suzery. 2021. Physicochemical characteristic of modified *edible film* made from gelatine of sea bass (*Lates calcarifer*) residue with palmitic acid and soybean protein isolate treatment. Food Research. 5(5): 157-166.
- Ahmad, F. A. 2017. pengaruh konsentrasi bahan penaut silang terhadap karakteristik plastik *biodegradable* hasil taut silang pati umbi gadung (*Dioscorea hispida* Dennst). Fakultas Kedokteran dan Ilmu Kesehatan. Universitas Islam Negeri Alauddin Makassar. Skripsi.
- Alvarado, M. C., S. G. N. Polongasa, and. P. D. C. Sanchez. 2023. A preliminary evaluation on the development of edible drinking straw from guso (*Eucheuma cottonii*) seaweeds. Proceeding of International Exchange and Innovation Conference on Engineering & Sciences (IEICES). pp: 51-58.
- Anggraini, L., D. F. Rosida, dan L. A. Wicaksono. 2022. Kemampuan laju transmisi uap dan biodegradasi *edible straw* dari pati umbi (ganyong, garut, kimpul) dan gelatin ikan. Jurnal Keteknik Pertanian Tropis dan Biosistem. 10(3): 226-235.



- Antweiler, W. 2020. Plastic straw bans spur innovation and a quest for eco-friendly alternatives. < <https://wernerantweiler.ca/blog.php?item=2020-02-17>>. Diakses 20 April 2025.
- Aranaz, I., A. R. Alcantara, M. C. Civera, C. Arias, B. Elorza, A. H. Caballero, and N. Acosta. 2021. Chitosan: An overview of its properties and applications. *Polymers*. 13(19): 3256.
- Arico, Z., dan S. Jayanti. 2017. Pengolahan limbah plastik menjadi produk kreatif sebagai peningkatan ekonomi masyarakat pesisir. *Martabe: Jurnal Pengabdian Masyarakat*. 1(1): 1-6.
- Aripin, S., B. Saing, dan E. Kustiyah. 2017. Studi pembuatan bahan alternatif plastik *biodegradable* dari pati ubi jalar dengan *plasticizer* gliserol dengan metode *melt intercalation*. *Jurnal Teknik Mesin*. 6: 1–6.
- Armiani, S., S. R. Fajri, B. M. Harisanti, dan B. Y. Pidiawati. 2021. Pemberdayaan keterampilan masyarakat melalui pengolahan sampah plastik. *Lambung Inovasi: Jurnal Pengabdian Kepada Masyarakat*. 6(1): 31-37.
- Astuti, K. W., V. F. Rizqiyah, dan T. Ardiato. 2022. Pengaruh derajat deasetilasi kitosan pada *coating* nata de coo-kitosan sebagai bahan antibakteri. *Jurnal Warta Akrab*. 2(46): 23- 30.
- Astuti, S. I., P. Lestari, T. Aprianingsih, T. Z. Sumardani, G. C. Wicaksana, dan A. Sholiah. 2022. Pengaruh suhu terhadap kelarutan dan viskositas pada gula pasir. *INKUIRI: Jurnal Pendidikan IPA*. 11(1): 19-21.
- Awadhiya, A., D. Kumar, and V. Verma. 2016. Crosslinking of agarose bioplastic using citric acid. *Carbohydrate Polymers*. 151: 60-67.
- Bagiana, I. K., B. Nugraheni, dan D. Wigati. 2020. Karakteristik fisik *coating film* kombinasi pati jagung-kitosan dan penetapan kadar vitamin C pada buah dan sayur. *Jurnal Farmasi Sains dan Praktis (JFSP)*. 6(1): 31-38.
- Bimo, T. 2022. Pengaruh variasi pH pada minuman berkarbonasi terhadap kekerasan permukaan resin komposit *nanofill*. *Fakultas Kedokteran Gigi. Universitas Gadjah Mada. Skripsi*.
- Boisacq, P., M. D. Keuster, E. Prinsen, Y. Jeong, L. Bervoets, M. Eens, A. Covaci, T. Willems, and T. Groffen. Assessment of poly- and perfluoroalkyl substances (PFAS) in commercially available drinking straws using targeted and suspect screening approaches. *Food Additives & Contaminants: Part A*. 40(9): 1230-1241.
- Brilianti, K. F., A. Ridio, dan S. Sedjati. 2023. Sifat mekanik dan ketebalan bioplastik dari *Kappaphycus alvarezii* menggunakan variasi konsentrasi amilum dengan pemlastis gliserol. *Journal of Marine Research*. 12(1): 95-102.



- Burdon, C. A., H. T. O'Coonor, J. A. Gifford, and S. M. Shirreffs. 2010. Influence of beverage temperature on exercise performance in the heat: a systematic review. *International Journal of Sport Nutrition and Exercise Metabolism*. 166-174.
- Butler, B. L., P. J. Vergant, R. F. Testin, J. M. Bunn, and J. L. Wiles. 1996. Mechanical properties of edible chitosan films as affected by composition and storage. *J Food Science*. 61(5): 953-961.
- Byun, Y., and Y. T. Kim. 2014. *Bioplastic for Food Packaging: Chemistry and Physics*. Innovations in Food Packaging. A Volume in Food Science and Technology. 2nd Edition. Academic Press, New York.
- Chandak, A., S. B. Dhull, S. P. Bangar, and A. V. Rusu. 2022. Effects of cross-linking on physicochemical and film properties of lotus (*nelumbo nucifera* g.) seed starch. *Foods*. 11(19): 3069.
- Chanjarujit, W., P. Honsprabhas, and S. Chaiseri. 2018. Physicochemical properties and flavor retention ability of alkaline calcium hydroxide-mungbean starch films. *Carbohydrate Polymers*. 198: 473-480.
- Chapko, M. J. 2018. Effects of serving temperature on sensory perception and acceptance of brewed coffee. University of Arkansas. Thesis.
- Chen, M., T. Runge, L. Wang, R. Li, J. Feng, X. Shu, and Q. Shi. 2018. Hydrogen bonding impact on chitosan plasticization. *Carbohydrate Polymers*. 200: 115-121.
- Chen, C. C., Q. J. Wu, Z. M. Wan, Q. L. Yang, Z. Y. Xu, D. G. Li, ... and O. J. Rojas. 2022. Mildly processed chitin used in one-component drinking straws and single use materials: Strength, biodegradability and recyclability. *Chemical Engineering Journal*. 442: 136173.
- Christwardana, M., Ismojo, and S. Marsudi. 2021. Physical, thermal stability, and mechanical characteristics of new bioplastic from blends cassava and tannia starches as green material. *Molekul*. 16(1): 46-56.
- Cisneros-Zevalios, L., and J. M. Krochta. 2003. Dependence of coating thickness on viscosity of coating solution applied to fruits and vegetables by dipping method. *JFS: Food Engineering and Physical Properties*. 68(2): 503-510.
- Coniwanti, P., D. Pertiwi, dan D. M. Pratiwi. 2014. Pengaruh peningkatan konsentrasi gliserol dan VCO (*Virgin Coconut Oil*) terhadap karakteristik *edible film* dari tepung aren. *Jurnal Teknik Kimia*. 20(2): 17-24.
- Cui, C. L., S. Zhao, Z. Zhang, M. Li, R. Shi, and Q. Sun. 2023. Preparation and characterization of corn starch straws with strong mechanical properties by extrusion and retrogradation. *Industrial Crops and Products*. 191: 115991.
- Darmawan, M. S., F. Daeni, T. S. Kurniawan, P. Listiaji. 2022. Preparation and characterization of *edible straw* made from dragon fruit peel to solve the problem



- of plastic waste. *Journal of Environmental and Science Education*. 2(2): 106-110.
- Darni, Y., T. M. Sitorus & M. Hanif. 2014. Produksi bioplastik dari sorgum dan selulosa secara termoplastik. *Jurnal Rekayasa Kimia & Lingkungan*. 10(2): 55–62.
- Desire, A. Y., N. Charlemagne, K. D. Claver, T. F. Achille, and S. Marianne. 2021. Starch-based edible films of improved cassava varieties Yavo and TMS reinforced with microcrystalline cellulose. *Heliyon*. 16(7): 06804.
- Distantina, S., R. A. Lestary, dan L. N. Jazlina. 2018. Kecepatan pelepasan urea dari *Controlled Release Fertilizer (CRF)*: Pengaruh rasio *Carboxymethylcellulose (CMC)* – Karagenan. *Prosiding Seminar Nasional Teknik Kimia “Kejuangan”*. 1-7.
- Divers Clean Action. 2018. Jumlah sedotan plastik di Indonesia. <<http://www.diverscleanaction.org/>>. Diakses 10 November 2024.
- Dong, T., W. Chen, C. Cai, F. Bai, Z. Zhou, J. Wang, and W. Li. 2023. Water-stable, strong, biodegradable lignocellulose straws replacement for plastic straws. *Chemical Engineering Journal*. 451: 1-12.
- Dou, R., Y. Zhou, H. Fang, F. X. Liu, X. Yan, and B. Wang. 2024. Hydrogen bonding regulation on phase change in stimuli responsive copolymer aqueous solution. *Polymer Testing*. 131: 1-10.
- Dwimayasanti, R., dan B. Kumayanjati. 2019. Karakterisasi *edible film* dari karagenan dan kitosan dengan metode *layer by layer*. *JPBKP*. 14(2): 141-150.
- Ekayana, A. A. G., dan I. G. A. A. Santika. 2021. Alat pencetak *edible straw* berbasis mikrokontroler. *ELKOMIKA: Jurnal Teknik Elektrik, Teknik Telekomunikasi, & Teknik Elektronika*. 9(4): 952-965.
- Eriningsih, R., R. Yulina, dan T. Mutia. 2011. Pembuatan karboksimetil selulosa dari limbah tongkol jagung untuk pengental pada proses pencapan tekstil. *Arena Tekstil*. 26(2): 105-113.
- Eristina, R. D. 2018. Pengaruh Penambahan Kitosan Terhadap Sifat Mekanik Bioplastik Pati Ubi Kayu dengan *Plasticizer* Gliserol dan *Zinc Oxide (ZNO)* sebagai Penguat. Fakultas MIPA. Universitas Brawijaya. Skripsi.
- Fadhallah, E. G., A. S. Zuidar, S. Hidayati, Haidawati, A. H. Dameswary, and A. T. Ramadhani. 2025. Development of sustainable bioplastic composite films from cocoa pod husk waste cellulose and kappa-carrageenan. *CarakaTan: Journal of Sustainable Agriculture*. 40(1):34-51.
- Fang, H. W., K. Y. Li, T. L. Su, T. C. K. Yang, J. S. Chang, P. L. Lin, and W. C. Chang. 2008. Dip coating assisted polylactic acid deposition on steel surface: Film thickness affected by drag force and gravity. *Materials Letters*. 62: 3739-3741.



- Farroti, E., and M. Natalini. 2018. Injection molding. Influence of process parameters on mechanical properties of polypropylene polymer. A first study. *Procedia Structural Integrity*. 8: 256-264.
- Feky, A. R. E., M. Ismaiel, M. Yilmaz, F. M. Madkour, A. E. Nemr, and H. A. H. Ibrahim. 2024. Biodegradable plastic formulated from chitosan of *Aristeus antennatus* shells with castor oil as a plasticizer agent and starch as a filling substrate. *Scientific Reports*. 14:11161.
- Fernández-Pan, I., K. Ziani, R. Pedroza-Islas, and J. I. Maté. 2010. Effect of drying conditions on the mechanical and barrier properties of films based on chitosan. *Drying Technology*. 28: 1350–1358.
- Firmansyah, J. 2018. Eksplanasi ilmiah air mendidih dalam suhu ruang. *Jurnal Filsafat Indonesia*. 1(1): 75-79.
- Fitri, U. D., Y. S. K. Dewi, dan N. E. Saputri. 2024. Karakteristik *edible film sodium caseinate liang-teh* kaya antioksidan. *Jurnal Agroindustri*. 14(1): 100-112.
- Fitria, F. R. 2023. Pengaruh rasio volume larutan kitosan – CMC (*Carboxy methyl cellulose*) terhadap sifat fisik dan kimia bioplastik. Fakultas Pertanian. Universitas Gadjah Mada. Skripsi.
- Fitriani, S., dan E. Sribudiani. 2009. Pengembangan formulasi sirup berbahan baku kulit dan buah nenas (*Ananas comosus* L.Merr). *Jurnal SAGU*. 8: 34–39.
- Fitriyah, D., M. Ubaidillah, dan F. Oktaviani. 2020. Analisis kandungan gizi beras dari beberapa galur padi transgenik Pac Nagdong/Ir36. *ARTERI: Jurnal Ilmu Kesehatan*. 1(2): 154-160.
- Florez, M., E. Guerra-Rodriguez, P. Cazon, and M. Vazquez. 2022. Chitosan for food packaging: Recent advances in active and intelligent films. *Food Hydrocolloids*. 124: 1-16.
- Fouda, M.M.G., A Halim., and S. Al-Deyab. 2013. Antibacterial modification of cotton using nanotechnology. *Carbohydrate Polymers*. 92: 943-954.
- Freeland, B., E. McCarthy, R. Balakrishnan, S. Fahy, A. Boland, K. D. Rochfort, M. Dabros, R. Marti, S. M. Kelleher, and J. Gaughran. 2022. A review of polylactic acid as a replacement material for single-use laboratory components. *Materials*. 15(9): 2989.
- Gontard, N., S. Guilbert, and J. L. Cuq. 1992. Edible wheat gluten film: influence of the main process variables on film properties of an edible wheat gluten film. *Journal of Food Science*. 58: 206-211.
- Gozali, T., W. P. Wijaya, dan M. I. Rengganis. 2020. Pengaruh konsentrasi CMC dan konsentrasi gliserol terhadap karakteristik *edible packaging* kopi instan dari pati kacang hijau (*Vigna radiata* L.). *Pasundan Food Technology Journal*. 1(7): 1-9.



- Grosso, D. 2011. How to exploit the full potential of the dip-coating process to better control film formation. *J. Mater. Chem.* 21: 17033-17038.
- Han, J. H. 2014. *Innovations in Food Packaging Second Edition*. Plano TX, USA.
- Hardinsyah, D., Mira, dan G. Fathin. 2011. *Aspek Gizi dan pH Berbagai Minuman Komersial*. Fakultas Ekologi Manusia. IPB University.
- Hegde, P. D. 2021. *A Brief History of Great Inventions*. K. K. Publications, New Delhi.
- Homez-Jara, A., L. D. Daza, D. M. Auirre, J. A. Munoz, J. F. Solanilla, and H. A. Vaquiro. 2018. Characterization of chitosan *edible films* obtained with various polymer concentrations and drying temperatures. *International Journal of Biological Macromolecules*. 11: 1233-1240.
- Hundekari, S. N., and S. B. Swami. 2024. Development of edible film from cassava starch and its physico-mechanical properties. *International Journal of Food and Fermentation Technology*. 14(2): 539-547.
- Ibrahim, S. M., N. Negishi, A. K. Masrom, B. Mazinani, A. Ramli, A. Isnin, and M. Z. A. Malek. 2012. TiO₂ Transparent Thin Film for Eliminating Toluene. *ISRN Nanotechnology*. 24: 1-9.
- Ibrahim, M. A., M. H. Alhalafi, E. M. Emam, H. Ibrahim, R. M. Mosaad. 2023. A review of chitosan and chitosan nanofiber: preparation, characterization, and its potential applications. *Polymers*. 15(13): 1-35.
- Ikhwanuddin. 2018. *Pembuatan dan karakterisasi bioplastik berbasis serbuk daun pisang batu dan carboxymethyl cellulosa (CMC) yang diperkuat oleh gum arabic*. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Sumatera Utara. Tesis.
- Islam, M.M., S. Massum, M. M. Rahman, M. Ashraful, I. Molla, A. Shaikh, and S. K. Roy. 2011. Preparation of chitosan from shrimp shell and investigation of its properties, *IJBAS 7 IJENS*, 11(1): 77-80.
- Ismail, N.M., A. Bono, A.C.R Valintinus, S. Nilus and L.M. Vhing, 2010. Optimization of reaction conditions for preparing *carboxymethyl cellulose*. *Journal of Applied Sciences*. 10(21).
- Jang, J., Y. J. Seol, H. J. Kim, J. Kundu, S. W. Kim, and D. W. Cho. 2014. Effects of alginate hydrogel cross-linking density on mechanical and biological behaviors for tissue engineering. *Journal of the Mechanical Behavior of Biomedical Materials*. 37: 69-77.
- Jongjareonrak, A., S. Benjakul, W. Visessanguan, T. Prodpran, and M. Tanaka. 2006. Characterization of *edible films* from skin gelatin of brownstripe red snapper and bigeye snapper. *Food Hydrocoll.* 20(4): 492-501.



- Kellersztein, I., D. Tish, J. Pederson, M. Bechthold, and C. Daraio. 2024. Multifunctional biocomposite materials from *chlorella vulgaris* microalgae. *Adv. Mater.* 1-12.
- Khairati, M. 2022. Pemurnian gliserol. *Jurnal Jejaring Matematika dan Sains.* 4(2): 35-40.
- Kirk, and Othmer. 2012. *Encyclopedia of Chemical Technology*, Vol. 12, Edisi 4. John Wiley & Sons Inc, New York.
- Kong, P., S. M. Rosnan, and T. Enomae. 2024. Carboxymethyl cellulose–chitosan *edible films* for food packaging: A review of recent advances. *Carbohydrate Polymers.* 346: 1-23.
- Koufman, J. A., and N. Johnston. 2012. Potential benefits of pH 8.8 alkaline drinking water as an adjunct in the treatment of reflux disease. *Annals of Otolology, Rhinology & Laryngology.* 121(7): 431-434.
- Krochta, J. M., E. A. Baldwin, and C. M. Nisperos. 1994. *Edible Coating and Film to Improve Food Quality.* Technomic Publishing Company, New York.
- Lan, W., L. He, and Y. Liu. 2018. Preparation and properties of sodium carboxymethyl cellulose/sodium alginate/chitosan composite film. *Coatings.* 8(8): 291.
- Langkong, J., N. K. Sukendar, dan Z. Ihsan. 2018. Studi pembuatan minuman isotonik berbahan baku air kelapa tua (*Cocos nificera* l) dan ekstrak belimbing wuluh (*Avverhoa bilimbi* l) menggunakan metode sterilisasi non-thermal selama penyimpanan. *Canrea Journal: Food Technology, Nutritions, and Culinary Journal.* 1(1): 53-62.
- Leolovich, M. 2014. Crystallinity and hidrophility of chitin and chitosan. *Research and Review Journal of Chemistry.* 3(3): 7-15.
- Leonard, K., J. Kurawaki, K. Hayakawa, M. T. Tun, and Y. Kusumoto. 2009. Preparation and characterization of copper(ii) tetrasulfonated phthalocyanine nanoparticles formed by laser ablation in poor solvents. *Colloid and Polymer Science.* 287(7): 773–778.
- Lerner, A., F. Gordian, and L. Gonzales. 2019. Turn away from plastic. Sustainability Initiatives, University of Central Florida. <<https://sustainable.ucf.edu/wp-content/uploads/2019/04/Turn-Away-From-Plastics.pdf>>. Diakses 15 April 2025.
- Lestari, I., D. F. Rosida, dan L. A. Wicaksono. 2023. Kajian kualitas fisik *edible straw* dari pati ubi jalar kuning (*Ipomea batatas* L.). *Jurnal Pangan dan Agroindustri.* 11(2): 53-60.
- Li, B., J. Elango, and W. Wu. 2020. Recent advancement of molecular structure and biomaterial function of chitosan from marine organisms for pharmaceutical and nutraceutical application. *Applied Sciences (Switzerland).* 10(14): 30–50.



- Liu, G. S., K. Shi, and H. Sun. 2023. Research progress in hemicellulose-based nanocomposite film as food packaging. *Polymers*. 15(4): 979.
- Liu, Y., N. Li, X. Zhang, T. Wei, M. Ma, Q. Sun, M. Li, and F. Xie. 2024. Eco-friendly drinking straws: Navigating challenges and innovations. *Trends in Food Science & Technology*. 148: 1-15.
- Liu, Y., W. Peng, T. Wei, Y. Yuan, X. Cao, M. Ma, Q. Sun, M. Li, and F. Xie. 2024. Strong, anti-swelling, and biodegradable seaweed-based straws with surface mineralized CaCO₃ armor. *Carbohydrate Polymers*. 341: 122347.
- Ma, C. Y., H. T. Tao, C. P. Tan, S. J. Gao, Z. H. L. Guo, ... and L. Lu. 2023. Effects of polyols with different hydroxyl numbers on the structure and properties of starch straws. *Carbohydrate Polymers*. 321: 121297.
- Ma, C. G. Wang, C. Xia, L. Guo, B. Cui, X. Du, J. Wang, and C. Sun. 2024. Effects of different ratios of glycerol to erythritol on the structure and properties of starch straws during long term storage. *Food Chemistry*. 46: 4141862.
- Maghfiroh, W. Sumarni, dan E. B. Susatyo. 2013. Sintesis dan karakterisasi *edible film* kitosan termodifikasi PVA dan sorbitol. *Indonesian Journal of Chemical Science*. 1(2): 1-6.
- McJannet, D., F. Cook, and S. Burn. 2008. Evaporation Reduction by Manipulation of Surface Area to Volume Ratios: Overview, Analysis and Effectiveness. The Urban Water Security Research Alliance, Queensland.
- Mong, Y. T. and E. B. Salleh. 2024. Development of *edible straw* from apple and durian peel. *Bioprocessing and Biomass Technology*. 3(1): 47-52.
- Mostafavi, F. S., and D. Zaeim. 2020. Agar-based edible films for food packaging applications - A review. *International Journal of Biological Macromolecules*. 159: 1165-1176.
- Mothe, C. G. and I. C. Miranda. 2013. Study of kinetic parameters of thermal decomposition of bagasse and sugarcane straw using friedman and ozawa-flynn-wall isoconversional methods. *Journal of Thermal Analysis and Calorimetry*. 113(2): 497-505.
- Muin, R., D. Anggraini, dan F. Malau. 2017. Karakteristik fisik dan antimikroba *edible film* dari tepung tapioka dengan penambahan gliserol dan kunyit putih. *Jurnal Teknik Kimia*. 23(3): 191-198.
- Mustariani, B. A. A., S. Sulistiyana, P. R. Fauziah, dan M. Roifah. 2025. Studi pembuatan bioplastik dari pati tapioka dengan pektin kulit buah naga (*Hylocereus polyrhizus*) dan karagenan. *ALCHEMY Jurnal Penelitian Kimia*. 21(1):121-129.
- Nadarajah, K. 2005. Development and characterization of antimicrobial *edible films* from crawfish chitosan. Department of Food Science. University of Paradeniya. Dissertation.



- Nadhira, R., dan Y. Cahyana. 2023. Kajian sifat fungsional dan amilografi pati dengan penambahan senyawa fenolik (review). *Jurnal Penelitian Pangan*. 3(1): 14-19.
- Nahdi, M. S., F. Nurkolis, R. S. Dewi, A. Y. Nurrezkytaku, N. R. Fitriani, A. R. D. P. Sanjaya, D. A. Kumalawati, K. Nisah, and S. A. Saptari. 2022. *SARS edible straw* from sea grapes as an effort utilization of marine resources for health. *Scientific Foundation SPIROSKI*. 10(E): 1408-1414.
- Ni, H., H. Li, W. Hou, J. Chen, S. Miao, Y. Wang, and H. Li. 2024. From sea to sea: Edible, hydrostable, and degradable straws based on seaweed-derived insoluble cellulose fibers and soluble polysaccharides. *Carbohydrate Polymers*. 334: 122038.
- Nisa, M., A. Nuraisyah, dan N. A. Yusuf. 2016. Formulasi *patch* kosmetik lendir bekicot (*Achatina fulica*) dengan polimer kitosan dan berbagai variasi amilum. *Jurnal Ilmiah Manuntung*. 2(2): 233–238.
- Noshirvani, N., B. Ghanbarzadeh, R. R. Mokarram, M. Hashemi, and V. Coma. 2017. Preparation and characterization of active emulsified films based on chitosan-carboxymethyl cellulose containing zinc oxide nano particles. *International Journal of Biological Macromolecules*. 99: 530-538.
- Pakaya, S. W., Z. A. K. Antuli, dan S. Une. 2021. Kelapa (*Cocos nucifera*) dan ekstrak jeruk lemon (*Citrus limon*). *Jambura Journal of Food Technology (JJFT)*. 3(2): 102-111.
- Pérez-Marroquin, X. A., A. Vargas-Torres, R. G. Campos-Montiel, G. Callejas-Quijada, G. Campos-Lozada, A. León-López, and G. Aguirre-Alvarez. 2022. Development of a biomaterial based on starch-gelatin blends: Physical, mechanical and barrier properties. *Biotecnica*. 24(3): 107-114.
- Pinto, E. P., W. S. Tavares, R. S. Matos, A. M. Ferreira, R. P. Menezes, M. Eduardo, H. M. Costa, T. M. Souza, I. M. Ferreira, F. F. O. Sousa, and R. R. M. Zamora. 2018. Influence of low and high glycerol concentrations on wettability and flexibility of chitosan biofilms. *Quim. Nova*. 41(10): 1109-1116.
- Piskulich, Z. A., O. O. Mesele, and W. H. Thompson. 2019. Activation energies and beyond. *The Journal of Physical Chemistry*. 123: 7185-7194.
- Pramesti, S. T., Khabibi, N. B. A. Prasetya. 2012. Pemanfaatan kitosan termodifikasi asam askorbat sebagai adsorben ion logam besi(III) dan kromium(III). *Jurnal Kimia Sains dan Aplikasi*. 15(2): 70-75.
- Pratama, E. W. 2018. Optimasi proporsi kombinasi PEG 400 dan sorbitol sebagai *plasticizer* dalam formula sediaan *edible film* guaifenesin. Fakultas Farmasi. Universitas Gadjah Mada. Skripsi.
- Premadasa, R. P., H. P. S. Jayapala, P. A. S. A. Rathnasri, P. S. Jayasingha, and S. Y. Lim. 2024. Nutritive enriched edible, bioplastic straw from red seaweed, *Gracilaria*



verrucosa as an effort application of marine resources for health. *Edelweiss Applied Science and Technology*. 8(6): 7167-7177.

- Primadiamanti, A., Nofita, dan D. M. Muslim. 2017. Uji stabilitas asetosal bentuk sediaan tablet dan table salut enteric. *Jurnal Analisis Farmasi*. 2(3): 206-213.
- Putra, A. D., V. S. Johan, dan R. Efendi. 2017. Penambahan sorbitol sebagai *plasticizer* dalam pembuatan *edible film* pati sukun. *JOM Fakultas Pertanian*. 4(2): 1-15.
- Putranti, L. N., and P. S. Nugraheni. 2023. Effect of carboxymethyl cellulose addition on the characteristic of chitosan-based bioplastic. *IOP Conference Series: Earth and Environmental Science*. 1289 (012038).
- Putri, H. V. and M. A. F. Falah. 2021. Development of biodegradable straw using combination of unused rice and rice bran. *Agroindustri Journal*. 8(2): 550-559.
- Putri, A. K., H. P. Widayat, dan E. Indarti. 2023. Pengaruh penambahan *binding agent* dan *plastisizer* berbasis bahan alami terhadap karakteristik *edible straw*: a review. *Jurnal Ilmiah Mahasiswa Pertanian*. 8(4): 427-433.
- Rahman, S., S. Hasan, A. S. Nitai, S. Nam, A. K. Karmakar, S. Ahsan, M. J. A. Shiddiky, and M. B. Ahmed. 2021. Recent developments of carboxymethyl cellulose. *Polymers*. 13(8): 1345.
- Ratnayake, W., R. Hoover, and T. Warkentin. 2002. Pea starch: composition, structure and properties - a review. *Starch/Stärke*. 54: 217-234.
- Riccobelli, D., G. G. Al-Terke, P. Laaksonen, P. Metrangolo, A. Paananen, R. H. A. Ras, P. Ciarletta, and D. Vella. 2023. Flattened and wrinkled encapsulated droplets: Shape-morphing induced by gravity and evaporation. *Physical Review Letters*. 130(21): 1-7.
- Risandi, L., R. Holinesti, A. Faridah, dan S. Mustika. 2023. Pengaruh penambahan CMC (*carboxymethyl cellulose*) terhadap kualitas selai ubi jalar ungu. *Jurnal Pendidikan Tata Boga dan Teknologi*. 4(2): 298-305.
- Rodisi, D., I. Suryo, dan S. Iswanto. 2006. Pengaruh substitusi tepung ketan dengan pati sagu terhadap kadar air, konsistensi dan sifat oragonoleptik dodol susu. *Jurnal Peternakan Indonesia*. 11(1): 66-73.
- Rohmah, D. U. M., W. P. Luketsi, dan S. Windarwati. 2020. Analisis organoleptik *edible straw* dari buah nanas (*Ananas comosus* l.) Subgrade varietas queen. *Agrointek: Jurnal Teknologi Industri Pertanian*. 14(1): 24-35.
- Roy, P., L. Ashton, T. Wang, M. G. Corradini, E. D. G. Fraser, M. Thimmanagari, M. Tiessan, A. Bali, K. M. Saharan, A. K. Mohanty, and M. Misra. 2021. Evolution of drinking straws and their environmental, economic and societal implications. *Journal of Cleaner Production*. 316: 1-12.



- Safitri, D., E. A. Rahim, Prismawiryanti, dan R. Sikanna. 2017. Sintesis karboksimetil selulosa (CMC) dari selulosa kulit durian (*Durio zibethinus*). KOVALEN. 3(1): 58-68.
- Santoso, B., O. H. Tampubolon, Z. Wijaya, dan R. Pambayun. 2014. Interaksi pH dan ekstrak gambir pada pembuatan *edible film* anti bakteri. Agritech. 34(01): 8–13.
- Saputra, E., Krismiyati, H. Pramono, A. A. Abdillah, and M. A. Alamsyah. 2015. An *edible film* characteristic of chitosan made from shrimp waste as a plasticizer. Journal of Natural Science Research. 5(4): 118-124.
- Saputro, A. N. C. dan A. L. Ovita. 2017. Sintesis dan karakterisasi bioplastik dari kitosan pati ganyong (*Canna edulis*). Jurnal Kimia dan Pendidikan Kimia. 1(2): 13-21.
- Sarah, P. N. 2019. Penggunaan bahan silicon sebagai alternatif pengganti sedotan plastik. Jurnal Seni & Reka Rancang. 2(1): 119-126.
- Saravanan, S., R. S. Leena, and N. Selvamurugan. 2016. Chitosan based biocomposite scaffolds for bone tissue engineering. International Journal of Biological Macromolecules 93(13): 54–65.
- Savitri, R., dan A. S. Riska. 2021. Fenomena gaya hidup kunjungan ke took kopi: *Entertainment versus task switching*. Jurnal Lingkungan Binaan Indonesia. 10(2): 71-83.
- Savitri, N. H. M., S. Sedjati, dan A. Ridio. 2024. Penambahan sorbitol terhadap karakteristik *edible straw* dari karagenan. Journal of Marine Research. 13(1): 115-120.
- Setiani, W., T. Sudiarti, dan L. Rahmidar. 2013. Preparasi dan karakterisasi *edible film* dari poliblend pati sukun kitosan. Jurnal Valensi. 2(3): 100-109.
- Shah, S. S., F. Niaz, M. A. Ehsan, H. T. Das, M. Younas, A. S. Khan, H. U. Rahman, S. M. A. Nayem, M. Oyama, and M. A. Aziz. 2024. Advanced strategies in electrode engineering and nanomaterial modifications for supercapacitor performance enhancement: A comprehensive review. Journal of Energy Storage. 79: 1-68.
- Shahab, A. N. 2023. Sintesis lapis tipis TiO₂ *dopping* zn 10% w/w sebagai fotokatalis metilen biru menggunakan metode *dip-coating*. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Islam Indonesia. Skripsi.
- Sheng, J. J. 2011. Chapter 6 - Polymer viscoelastic behavior and its effect on field facilities and operations. Modern Chemical Enhanced Oil Recovery. 207-238.
- Shofia, I. H. Murdiningsih, dan N. Yanti. 2016. Pembuatan dan kajian sifat-sifat fisikokimia, mekanikal, dan fungsional *edible film* dari kitosan udang windu. Jurnal Bahan Alam Terbarukan. 5(2): 54-60.



- Silva, G. M., I. L. M. Ferreira, M. P. M. Costam and R. F. P. Rocha. 2023. Physicochemical properties of superabsorbent hydrogels formed by polyelectrolytic complexation of carboxymethylcellulose-chitosan at basic pH. *J. Braz. Chem. Soc.* 34(9): 1236-1249.
- Siregar, A. N., W. M. F. Wan, J. A. Ghani, C. H. C. Haron, and M. Rizal. 2014. Design and analysis of single screw extruder for jatropha seeds using finite element method. *Research Journal of Applied Science, Engineering and Technology.* 7(10): 2098-2105.
- Sjamsiah, J. Saokani, dan Lismawati. 2017. Karakteristik *edible film* dari pati kentang (*Solanum tuberosum* L.) dengan penambahan gliserol. *Jurnal Al-Kimia.* 2(5): 181- 192.
- Sofia, I., H. Murdiiningsih, dan N. Yanti. 2016. Pembuatan dan kajian sifat-sifat fisikokimia, mekanikal, dan fungsional *edible film* dari kitosan udang windu. *Jurnal Bahan Alam Terbarukan.* 5(2): 54-60.
- Suga, K. K., N. Aini, dan R. Setyawati. 2020. Pengaruh konsentrasi stpp dan lama perendaman terhadap karakteristik pati kimpul termodifikasi ikatan silang. *Agrointek.* 14(2): 199-212.
- Sulaeman, R., R. R. Z. D. W. Putri, R. Damayanti, F. Fauzan, M. R. Hidayan, and Y. Maharani. 2024. Characterization of eco-friendly straw based on chitosan from pupae exuviae of black soldier fly (*Hermetia illucens*). *AgriHealth: Journal of Agri-food, Nutrition and Public Health.* 5(2): 92-100.
- Sulistiawati, R. Sikanna, dan A. Febryanti. 2023. Sintesis dan karakterisasi *edible cup* dari alga merah (*Gracilaria verrucosa*). *Jurnal Saintiskom.* 1(1): 1-9.
- Sulistiyana, S., B. A. Riyandari, dan N. Nurkamariati. 2024. Sintesis dan karakterisasi film pengemas aktif dari kombinasi kitosan-alginat dan asam sitrat. *ALCHEMY Jurnal Penelitian Kimia.* 20(1): 120-129.
- Suppakul, P. 2006. Plasticizer and relative humidity effects on mechanical properties of cassava flour films. Department of Packaging Technology. Faculty of Agro-Industry. Kasetsart University. Bangkok.
- Supriyani, R. T. 2019. Pengaruh substitusi karagenan, tepung terigu dan sumber jenis serat (kayu secang, rosella dan kulit buah naga) terhadap karakteristik *edible straws*. Fakultas Teknik. Universitas Pasundan. Tugas Akhir.
- Supriyanto, S. A., M. D. Safitri, dan A. Fauzia. 2020. Sosialisasi pengurangan penggunaan sedotan plastik di lingkungan sekolah dan masyarakat. *J. Pengabdian Masyarakat MIPA dan Pendidikan MIPA.* 4(1): 122-130.
- Surya, Y. 2009. Suhu dan Termodinamika. PT Kandel, Tangerang.
- Suryani, T. Rihayat, Fitria, dan A. Safitri. 2022. Pembuatan bioplastik ramah lingkungan berbasis PLA-PCL dengan composite catechin dan kitosan sebagai bahan baru



- pengganti plastik berbasis petroleum. *Jurnal Reaksi (Journal of Science and Technology)*, 20(2): 1-6.
- Syahbanu, F., F. I. Napitupulu, S. Septiana, N. F. Aliuah. 2023. Struktur pati beras (*Oryza sativa* L.) dan mekanisme perubahannya pada fenomena gelatinisasi dan retrogradasi. *Agrointek*. 17(4): 755-767.
- Syarifuddin, A., dan Yuniarta. 2015. Karakterisasi *edible film* dari pektin albedo jeruk bali dan pati garut. *Jurnal Pangan dan Agroindustri*. 3(4): 1538-1547.
- Takou, V., A. Boldrin, T. F. Astrup, and A. Damgaard. 2019. Lca of single use plastic products in Denmark. Danish Environmental Protection Agency, Odense C.
- Trilaksani, W., B. Riyanto, dan S. N. K. Apriani. 2007. Karakteristik *edible film* dari konsentrat protein air limbah surimi ikan nila (*Oreochromis niloticus*). *Buletin Teknologi Hasil Perikanan*. 10(2): 60-72.
- Tranoudis, I., and N. Efron. 2004. Water properties of soft contact lens materials. *Contact Lens & Anterior Eye*. 27: 193-208.
- Tongdeesoontorn, W., L. J. Mauer, S. Wongruong. 2011. Effect of carboxymethyl cellulose concentration on physical properties of biodegradable cassava starch-based films. *Chemistry Central Journal*. 5(6): 2-8.
- Varela, A. I. G., M. Aymerich, D. N. Garcia, Y. C. Martin, P. A. A. Beule, E. Alvarez, C. B. Varela, and M. F. Arias. 2017. Sol-Gel glass coating synthesis for different applications: active gradient-index materials, microlens arrays and biocompatible channels. *INTECH*. 231-252.
- Veronika, T. 2024. Karakteristik biostraw dari karagenan dengan penambahan serat eceng gondok (*Eichhornia crassipes*). Fakultas Pertanian. Universitas Sultan Ageng Tirtayasa. Skripsi.
- Wang, B, Qin S, Yang Y, Shang-Quan R. 2007. Study on structure and properties of sodium alginate-chondroitin sulfate blend films. *Chem Res Appl*. 19(7): 740–744.
- Wang, X., Z. Pang, C. Chen, Q. Xia, Yubin Zhou, S. Jing, R. Wang, U. Ray, W. Gan, C. Li, G. Chen, B. Foster, T. Li, and L. Hu. 2020. All-natural, degradable, rolled-up straws based on cellulose micro- and nano-hybrid fibers. *Adv. Funct. Mater*. 1910417: 1-9.
- Widyaningsih, S., D. Kartika, dan Y. T. Nurhayati. 2012. Pengaruh penambahan sorbitol dan kalsium karbonat terhadap karakteristik dan sifat biodegradasi film dari pati kulit pisang. *Molekul*. 7(1): 69-81.
- Winayu, I. J., N. Ekantari, I. D. Puspitasari, Ustadi, W. Budhijanto, and P. S. Nugraheni. 2019. The effect of reduced acetic acid concentration on nano chitosan formulation as fish preservative. *International Conference on Food Science and Engineering*. 633: 1-7.



- Wulandari, I. A., M. W. Norasiva, S. N. Rahayu, L. Fadillah, J. Ardiansyah, H. R. Febriansyah, R. Y. Apriantara, dan R. Z. Musyafa. 2023. Penggunaan *edible rice straw* sebagai alternatif dari sedotan plastik. *Jurnal Majemuk*. 2(1): 131-137.
- Yadav, M., B. Kaushik, G. K. Rao, C. M. Srivastava, and D. Vaya. 2023. Advances and challenges in the use of chitosan and its derivatives in biomedical fields: A review. *Carbohydrate Polymer Technologies and Applications*. 5: 100323.
- Yan, H., C. Z. Chao, and M. L. Xiang. 2009. Thermal conductivity and mechanical properties of silicone rubber filled with different particle sized siC. *Advanced Materials Research*. 87-88: 137-142.
- Yang, J., C. Dahlstrom, H. Edlund, B. Lindman, and M. Norgren. 2019. pH-responsive cellulose–chitosan nanocomposite films with slow release of chitosan. *Cellulose*. 26: 3763-3776.
- Yanti, N. A. S. W. Ahmad, L. O. A. N. Ramadhan, Jamili, Muzuni, T. Walhidayah, and J. Mamangkey. 2021. Properties and application of edible modified bacterial cellulose film based sago liquid waste as food packaging. *Polymers*. 13(3570): 1-13.
- Yuniarto, A., Untara, dan B. Hari. 2013. Evaluasi data meteorologi kawasan nuklir Serpong. *Jurnal Teknologi Pengelolaan Limbah*. 16(3): 195-204.
- Zargar, Vida, M. Asghari, and A. Dashti. 2015. A review on chitin and chitosan polymers: structure, chemistry, solubility, derivatives, and applications. no. 00: 1–24
- Zhang, Y., Y. Wan, and W. Liu. 2022. Research state of disposable non-plastic straws. *PBM*. 7(4): 34-43.