

## DAFTAR PUSTAKA

- Ahmad, A.N., Abdullah Lim, S. dan Navaranjan, N. 2020. Development of sago (*Metroxylon sagu*)-based colorimetric indicator incorporated with butterfly pea (*Clitoria ternatea*) anthocyanin for intelligent food packaging. *Journal of Food Safety*, 40(4):12807.
- Alegantina, S. 2017. Penetapan Kadar Nikotin dan Karakteristik Ekstrak Daun Tembakau (*Nicotiana tabacum L.*). *Jurnal Penelitian dan Pengembangan Pelayanan Kesehatan*, 1(2):113-119.
- Ana, Z. dan Bertha, K.L. 2012. Ekstraksi dan analisis zat warna biru (anthosianin) dari bunga telang (*Clitoria ternatea*) sebagai pewarna alami. *Jurnal Teknologi Kimia dan Industri*, 1(1):356–365.
- Angriani, L. 2019. Potensi ekstrak bunga telang (*Clitoria ternatea*) sebagai pewarna alami lokal pada berbagai industri pangan. *Canrea Journal: Food Technology, Nutritions, and Culinary Journal*, 2(1):32–37.
- Anthika, B., Kusumocahyo, S.P. dan Sutanto, H. 2015. Ultrasonic approach in *Clitoria ternatea* (butterfly pea) extraction in water and extract sterilization by ultrafiltration for eye drop active ingredient. *Procedia Chemistry*, 16:237–244.
- Aprodru, I., Milea, Ş.A., Anghel, R.M., Enachi, E., Barbu, V., Crăciunescu, O., Râpeanu, G., Bahrim, G.E., Oancea, A. dan Stănciu, N. 2019. New functional ingredients based on microencapsulation of aqueous anthocyanin-rich extracts derived from black rice (*Oryza sativa L.*). *Molecules*, 24(18):3389.
- Arfisa, C., Widiyana, A.P. dan Bintari, Y.R. 2020. Perbandingan Kadar Merkuri (Hg) dan Aktivitas Antioksidan Ekstrak Metanolik Akar Eceng Gondok (*Eichornia crassipes*) di Daerah Lawang dan Pasuruan. *Jurnal Kedokteran Komunitas*, 8(1):1-8.
- Arisanti, C.I.S., Sukawati, C.B.A.C., Prasetia, I.G.N.J.A. dan Wirasuta, I.M.A.G. 2020. Stability of anthocyanins encapsulated from purple sweet potato extract affected by maltodextrin concentration. In *Macromolecular Symposia*, 391(1):1900127.
- Association of Official Analytical Chemists. 2005. *Official Methods of Analysis*. 18<sup>th</sup> edition, AOAC, Washington, DC.
- Bazaria, B., dan Kumar, P. 2017. Effect of dextrose equivalency of maltodextrin together with Arabic gum on properties of encapsulated beetroot juice. *Journal of Food Measurement and Characterization*, 11(1):156–163.

- Begum, Y.A. dan Deka, S.C. 2017. Stability of spray-dried microencapsulated anthocyanins extracted from culinary banana bract. *International Journal of Food Properties*, 20(12):3135–3148.
- Bilušić, T., Drvenica, I., Kalušević, A., Marijanović, Z., Jerković, I., Mužek, M.N., Bratanić, A., Skroza, D., Zorić, Z., Pedisić, S. dan Nedović, V. 2021. Influences of freeze-and spray-drying vs. encapsulation with soy and whey proteins on gastrointestinal stability and antioxidant activity of Mediterranean aromatic herbs. *International Journal of Food Science & Technology*, 56(4):1582-1596.
- Böger, B. R., Acre, L. B., Viegas, M. C., Kurozawa, L. E., dan Benassi, M. T. 2021. Roasted coffee oil microencapsulation by spray drying and complex coacervation techniques: Characteristics of the particles and sensory effect. *Innovative Food Science and Emerging Technologies*, 72:102739.
- Budiman, E. 2019. Pengaruh Rasio Bahan Penyalut dan Suhu Inlet Spray Dryer terhadap Karakteristik Mikrokapsul Ekstrak Bunga Telang (*Clitoria Ternatea* L.). Bachelor thesis, Universitas Pelita Harapan.
- Cai, X., Du, X., Cui, D., Wang, X., Yang, Z., dan Zhu, G. 2019. Improvement of stability of blueberry anthocyanins by carboxymethyl starch/xanthan gum combinations microencapsulation. *Food Hydrocolloids*, 91:238–245.
- Cano-Chauca, M., Stringheta, P.C., Ramos, A.M. dan Cal-Vidal, J. 2005. Effect of the carriers on the microstructure of mango powder obtained by spray drying and its functional characterization. *Innovative Food Science and Emerging Technologies*, 6(4):420–428.
- Chairany, M., Haliza, N. dan Bastian, F. 2021. Microencapsulation of three natural dyes from butterfly pea, Sappan wood, and turmeric extracts and their mixture base on cyan, magenta, yellow (CMY) color concept. *Canrea Journal: Food Technology, Nutritios, and Culinary Journal*, 4(1):91-101.
- Charles, A.L., Abdillah, A.A., Saraswati, Y.R., Sridhar, K., Balderamos, C., Masithah, E.D. dan Alamsjah, M.A. 2021. Characterization of freeze-dried microencapsulation tuna fish oil with arrowroot starch and maltodextrin. *Food Hydrocolloids*, 112:106281.
- Charurungsipong, P., Tangduangdee, C., Amornraksa, S., Asavasanti, S. dan Lin, J. 2020. Improvement of anthocyanin stability in butterfly pea flower extract by co-pigmentation with catechin. In *E3S web of conferences*, 141:03008. EDP Sciences.
- Chen, Q., Zhong, F., Wen, J., McGillivray, D. dan Quek, S.Y. 2013. Properties and stability of spray-dried and freeze-dried microcapsules co-encapsulated with fish oil, phytosterol esters, and limonene. *Drying Technology*, 31(6):707-716.

- Choiriyah, N.A. 2017. Ekstraksi senyawa antosianin dan fenolik rosella ungu dengan variasi pelarut. *Darussalam Nutrition Journal*, 1(1):16–21.
- Cilek, B., Luca, A., Hasirci, V., Sahin, S. dan Sumnu, G. 2012. Microencapsulation of phenolic compounds extracted from sour cherry pomace: effect of formulation, ultrasonication time and core to coating ratio. *European Food Research and Technology*, 235(4):587-596.
- Cisilya, T., Lestario, L.N. dan Cahyanti, M.N. 2017. Kinetika Degradasi serbuk antosianin daun miana (*Coleous scutellarioides* L. Benth) var. Crispa hasil mikroenkapsulasi. *Chimica et Natura Acta*, 5(3):146–152.
- da Rocha, C.B. dan Noreña, C.P.Z. 2021. Microencapsulation and controlled release of bioactive compounds from grape pomace. *Drying Technology*, 39(8):1018-1032.
- de Souza V.B., Thomazini M., Balieiro J.C. de C., dan Fávaro-Trindade C.S. 2015. Effect of spray drying on the physicochemical properties and colour stability of the powdered pigment obtained from vinification byproducts of the Bordo grape (*Vitis labrusca*), *Food and Bioproducts Processing*, 93:39–50.
- Ernawati, U.R., Khasanah, L.U. dan Anandito, R.B.K. 2014. Pengaruh variasi nilai dextrose equivalents (DE) maltodekstrin terhadap karakteristik mikroenkapsulan pewarna alami daun jati (*Tectona Grandis* L. f.). *Jurnal Teknologi Pertanian*, 15(2):111-120.
- Escher, G.B., Wen, M., Zhang, L., Rosso, N.D. dan Granato, D. 2020. Phenolic composition by UHPLC-Q-TOF-MS/MS and stability of anthocyanins from *Clitoria ternatea* L. (butterfly pea) blue petals. *Food chemistry*, 331:127341.
- Ezhilarasi, P.N., Indrani, D., Jena, B.S. dan Anandharamakrishnan, C. 2013. Freeze drying technique for microencapsulation of *Garcinia* fruit extract and its effect on bread quality. *Journal of Food Engineering*, 117(4):513–520.
- Ezhilarasi, P.N., Indrani, D., Jena, B.S. dan Anandharamakrishnan, C. 2014. Microencapsulation of *Garcinia* fruit extract by spray drying and its effect on bread quality. *Journal of the Science of Food and Agriculture*, 94(6):1116-1123.
- Flores, F.P., Singh, R.K. dan Kong, F. 2014. Physical and storage properties of spray-dried blueberry pomace extract with whey protein isolate as wall material. *Journal of Food Engineering*, 137:1-6.
- Fu, F. dan Hu, L. 2017. Temperature sensitive colour-changed composites. In *Advanced High Strength Natural Fibre Composites in Construction*. Woodhead Publishing.
- Fu, X., Wu, Q., Wang, J., Chen, Y., Zhu, G. dan Zhu, Z. 2021. Spectral characteristic, storage stability and antioxidant properties of anthocyanin

extracts from flowers of butterfly pea (*Clitoria ternatea* L.). *Molecules*, 26(22):7000.

Guo, M. dan Wang, G. 2019. History of whey production and whey protein manufacturing. *Whey Protein Production, Chemistry, Functionality, and Applications*; Guo, M., Ed:1-12.

Hamzah, Y., Jumat, N.A. and Sembok, W.W. 2013. Effect of drying on the storage stability of encapsulated anthocyanins powder extract from butterfly pea flower (*Clitoria ternatea*). In *13th ASEAN Food Conference 2013*:1–10.

Handayani, F., Apriliana, A. dan Ariyanti, L. 2019. Perbandingan Metode Maserasi dan Refluks terhadap Rendemen Ekstrak Daun Selutui Puka (*Tabernaemontana macrocarpa* Jack). *Jurnal Farmasi Galenika*, 6(1):33-42.

Hasna, T., Anandito, B.K., Khasanah, L.U., Utami, R. dan Manuhara, G.J. 2018. Pengaruh kombinasi maltodekstrin dan whey sebagai bahan penyalut pada karakteristik mikroenkapsul oleoresin kayu manis (*Cinnamomum burmanii*). *Agritech*, 38(3):259–264.

Hou, Z., Qin, P., Zhang, Y., Cui, S. dan Ren, G. 2013. Identification of anthocyanins isolated from black rice (*Oryza sativa* L.) and their degradation kinetics. *Food research international*, 50(2):691-697.

Jeyaraj, E.J., Lim, Y.Y. dan Choo, W.S. 2021. Extraction methods of butterfly pea (*Clitoria ternatea*) flower and biological activities of its phytochemicals. *Journal of food science and technology*, 58(6):2054-2067.

Jiménez-González, O. dan Guerrero-Beltrán, J.Á. 2021. Extraction, microencapsulation, color properties, and experimental design of natural pigments obtained by spray drying. *Food Engineering Reviews*, 13(4):769-811.

Karimi Sani, I., Alizadeh, M., Pirsa, S. dan Moghaddas Kia, E. 2019. Impact of operating parameters and wall material components on the characteristics of microencapsulated *Melissa officinalis* essential oil. *Flavour and Fragrance Journal*, 34(2):104-112.

Karrar, E., Mahdi, A.A., Sheth, S., Ahmed, I.A.M., Manzoor, M.F., Wei, W. dan Wang, X. 2021. Effect of maltodextrin combination with gum arabic and whey protein isolate on the microencapsulation of gurum seed oil using a spray-drying method. *International Journal of Biological Macromolecules*, 171:208-216.

Khazaei, K.M., Jafari, S.M., Ghorbani, M. dan Kakhki, A.H. 2014. Application of maltodextrin and gum Arabic in microencapsulation of saffron petal's anthocyanins and evaluating their storage stability and color. *Carbohydrate polymers*, 105:57-62.

- Kilara, A. dan Vaghela, M.N. 2018. Whey proteins. In *Proteins in food processing*. Woodhead publishing.
- Lakshan, S.A.T., Jayanath, N.Y., Abeysekera, W.P.K.M. dan Abeysekera, W.K.S.M. 2019. A commercial potential blue pea (*Clitoria ternatea* L.) flower extract incorporated beverage having functional properties. *Evidence-Based Complementary and Alternative Medicine*, 1(1):1-13.
- Laokuldilok, T. dan Kanha, N. 2015. Effects of processing conditions on powder properties of black glutinous rice (*Oryza sativa* L.) bran anthocyanins produced by spray drying and freeze drying. *LWT-Food Science and Technology*, 64(1):405-411.
- López Prado, A.S., Shen, Y., Ardoín, R., Osorio, L.F., Cardona, J., Xu, Z. dan Prinyawiwatkul, W. 2019. Effects of different solvents on total phenolic and total anthocyanin contents of *Clitoria ternatea* L. petal and their anti-cholesterol oxidation capabilities. *International Journal of Food Science & Technology*, 54(2):424-431.
- Lu, W., Yang, X., Shen, J., Li, Z., Tan, S., Liu, W. dan Cheng, Z. 2021. Choosing the appropriate wall materials for spray-drying microencapsulation of natural bioactive ingredients: Taking phenolic compounds as examples. *Powder Technology*, 394:562-574.
- Mahdavi, S.A., Jafari, S.M., Assadpoor, E. dan Dehnad, D. 2016. Microencapsulation optimization of natural anthocyanins with maltodextrin, gum Arabic and gelatin. *International journal of biological macromolecules*, 85:379-385.
- Martinus, B.A. dan Haryanti, M.D. 2017. Pengaruh pH Dan Suhu Terhadap Stabilitas Antosianin Dari Ekstrak Kulit Ubi Jalar Ungu (*Ipomoea Batatas* (L.) Lam.). *Chempublish Journal*, 2(2):33-41.
- Mihalcea, L., Barbu, V., Enachi, E., Andronoiu, D.G., Râpeanu, G., Stoica, M., Dumitraşcu, L. dan Stănciuc, N. 2020. Microencapsulation of red grape juice by freeze drying and application in jelly formulation. *Food Technology and Biotechnology*, 58(1):20–28.
- Moser, P., Souza, R.T.D. dan Nicoletti Telis, V.R. 2017. Spray drying of grape juice from hybrid cv. BRS Violeta: microencapsulation of anthocyanins using protein/maltodextrin blends as drying aids. *Journal of Food Processing and Preservation*, 41(1):12852.
- Nogueira, G.F., Fakhouri, F.M., Velasco, J.I. dan de Oliveira, R.A. 2019. Active edible films based on arrowroot starch with microparticles of blackberry pulp obtained by freeze-drying for food packaging. *Polymers*, 11(9):1382.
- Nur, F.U.A., Muhammad, Y., Sri, I., Mahyati, M. dan Akhmad, R. 2020. Kopigmentasi antosianin dan polifenol dari ubi jalar ungu (*Ipomoea*

batatas L.) menggunakan Na-Kaseinat. *Jurnal Sains dan Teknologi Pangan*, 5(2):2760–2771.

Oktavi, R.A., Cahyono, B. and Suzery, M. 2020. Enkapsulasi ekstrak antosianin dari bunga rosela (*Hibiscus sabdariffa* L.) dengan variasi penyalut. *Akta Kimia Indonesia*, 5(2):86–101.

Ozkan, G., Franco, P., De Marco, I., Xiao, J., dan Capanoglu, E. 2019. A review of microencapsulation methods for food antioxidants: Principles, advantages, drawbacks and applications. *Food Chemistry*, 272:494–506.

Pan, L.H., Chen, L.P., Wu, C.L., Wang, J.F., Luo, S.Z., Luo, J.P. dan Zheng, Z. 2022. Microencapsulation of blueberry anthocyanins by spray drying with soy protein isolates/high methyl pectin combination: Physicochemical properties, release behavior in vitro and storage stability. *Food Chemistry*, 395:133626.

Paramita, I.M.I., Mulyani, S. dan Hartati, A. 2015. Pengaruh konsentrasi maltodekstrin dan suhu pengeringan terhadap karakteristik bubuk minuman sinom. *Jurnal Rekayasa dan Manajemen Agroindustri*, 3(2):58–68.

Parthasarathi, S. dan Anandharamakrishnan, C. 2016. Enhancement of oral bioavailability of vitamin E by spray-freeze drying of whey protein microcapsules. *Food and Bioproducts Processing*, 100:469-476.

Pertiwi, R.B., Hasbullah, U.H.A.A. dan Affandi, A.R., 2021. Copigmentation of anthocyanin extract from parijoto fruit (*Medinilla speciosa*) and its stability at different temperatures and heating durations. *Indonesian Food and Nutrition Progress*, 18(2):50–59.

Pieczykolan, E. dan Kurek, M.A. 2019. Use of guar gum, gum arabic, pectin, beta-glucan and inulin for microencapsulation of anthocyanins from chokeberry. *International Journal of Biological Macromolecules*, 129:665-671.

Purnomo, W., Khasanah, L.U. dan Anandito, B.K. 2016. Pengaruh ratio kombinasi maltodekstrin, karagenan dan whey terhadap karakteristik mikroenkapsulan pewarna alami daun jati (*Tectona grandis* Lf). *Jurnal Aplikasi Teknologi Pangan*, 3(3):99-107.

Puspita, D., Tjahyono, Y.D., Samalukang, Y., Im Toy, B.A. dan Totoda, N.W. 2018. Produksi Antosianin Dari Daun Miana (*Plectranthus scutellarioides*) Sebagai Pewarna Alami. *Pro Food*, 4(1):298-303.

Putri, S.R.P., Saati, E.A. dan Damat, D. 2022. Karakteristik Fisikokimia Fruit Leather Apel Manalagi (*Malus sylvestris*) dengan Penambahan Ekstrak Bunga Telang (*Clitoria ternatea*) dan Gum Arab. *Food Technology and Halal Science Journal*, 5(1):15-31.

- Putri, N.I., Chance, M.J., Rahardjo, P.A.C. dan Ananingsih, V.K. 2019. Pengaruh jenis dan konsentrasi enkapsulan dalam proses pembuatan serbuk antosianin dari kubis merah dan bunga telang. *Jurnal Teknologi Pangan dan Gizi*, 18(1):1–9.
- Raj, G.V.S. dan Dash, K.K. 2022. Microencapsulation of dragon fruit peel extract by freeze-drying using hydrocolloids: optimization by hybrid artificial neural network and genetic algorithm. *Food and Bioprocess Technology*, 1:1–15.
- Rezende, Y.R.R.S., Nogueira, J.P. dan Narain, N. 2018. Microencapsulation of extracts of bioactive compounds obtained from acerola (*Malpighia emarginata* DC) pulp and residue by spray and freeze drying: Chemical, morphological and chemometric characterization. *Food Chemistry*, 254:281–291.
- Rosaini, H., Halim, A. dan Astuti, R. 2018. Mikroenkapsulasi pirazinamida menggunakan manitol dengan metode emulsifikasi penguapan pelarut. *Jurnal Farmasi Higea*, 10(1):57–67.
- Sa'adah, H. dan Nurhasnawati, H. 2017. Perbandingan pelarut etanol dan air pada pembuatan ekstrak umbi bawang tiwai (*Eleutherine americana* Merr) menggunakan metode maserasi. *Jurnal ilmiah manuntung*, 1(2):149–153.
- Samber, L.N., Semangun, H. dan Prasetyo, B., 2013. Karakteristik antosianin sebagai pewarna alami. In *Prosiding Seminar Biologi 2013*, 10(3):183–187.
- Saponjac, V.T.T., Canadanovic-Brunet, J.S., Cetkovic, G.S., Jaksic, M.V., Vulic, J.J., Stajcic, S.S. dan Sergelj, V.N. 2020. Optimisation of beetroot juice encapsulation by freeze-drying. *Polish Journal of Food and Nutrition Sciences*, 70(1):25–34.
- Saptarini, N.M., Suryasaputra, D. dan Nurmalia, H. 2015. Application of Butterfly Pea (*Clitoria ternatea* Linn) extract as an indicator of acid-base titration. *J. Chem. Pharm. Res.*, 7(2):275–280.
- Sarofa, U., Anggrahini, D. dan Winarti, S. 2012. Ekstraksi dan stabilitas warna ubi jalar ungu sebagai pewarna alami. *Jurnal Teknik Kimia*, 3(1):207–214.
- Sharif, N., Khoshnoudi-Nia, S. dan Jafari, S.M. 2020. Nano/microencapsulation of anthocyanins; a systematic review and meta-analysis. *Food Research International*, 132:109077.
- Silitonga, P. dan Sitorus, B. 2014. Enkapsulasi pigmen antosianin dari kulit terong ungu. *Jurnal Kimia Khatulistiwa*, 3(1):44–49.
- Siregar, T.M. dan Kristanti, C., 2019. Mikroenkapsulasi senyawa fenolik ekstrak daun kenikir (*Cosmos caudatus* K.). *Jurnal Aplikasi Teknologi Pangan*, 8(1):31–37.

- Syamsul, E.S., Hakim, Y.Y. dan Nurhasnawati, H. 2019. Penetapan kadar flavonoid ekstrak daun kelakai (*Stenochlaena palustris* (Burm. F.) Bedd.) dengan metode spektrofotometri UV-Vis. *Jurnal Riset Kefarmasian Indonesia*, 1(1):11-20.
- Wahyuni, H., Hanum, T. dan Murhadi, M. 2017. Pengaruh kopigmentasi terhadap stabilitas warna antosianin ekstrak kulit terung belanda (*Cyphomandra betacea* Sendtn). *Jurnal Teknologi & Industri Hasil Pertanian*, 22(1):40–51.
- Wahyuningsih, S., Wulandari, L., Wartono, M.W., Munawaroh, H. and Ramelan, A.H. 2017. The effect of pH and color stability of anthocyanin on food colorant. In *IOP conference series: Materials science and engineering 2017*, 193(1):012047. IOP Publishing.
- Wulandari, D., Hanum, T. dan Rangga, A. 2018. Efek kopigmentasi dari katekol dan tanin terhadap stabilitas antosianin bekatul beras ketan hitam (*Oryza sativa glutinosa*) selama penyimpanan. *Jurnal Teknologi & Industri Hasil Pertanian*, 23(1):31–44.
- Xu, X., Zhong, J., Chen, J., Liu, C., Luo, L., Luo, S., Wu, L. dan McClements, D.J. 2016. Effectiveness of partially hydrolyzed rice glutelin as a food emulsifier: Comparison to whey protein. *Food Chemistry*, 213:700–707.
- Yadav, K., Bajaj, R.K., Mandal, S. dan Mann, B. 2020. Encapsulation of grape seed extract phenolics using whey protein concentrate, maltodextrin and gum arabica blends. *Journal of food science and technology*, 57(2):426-434.
- Yamashita, C., Chung, M.M.S., dos Santos, C., Mayer, C.R.M., Moraes, I.C.F. dan Branco, I.G. 2017. Microencapsulation of an anthocyanin-rich blackberry (*Rubus spp.*) by-product extract by freeze-drying. *Lwt*, 84:256-262.
- Yu, Y. dan Lv, Y. 2019. Degradation kinetic of anthocyanins from rose (*Rosa rugosa*) as prepared by microencapsulation in freeze-drying and spray-drying. *International Journal of Food Properties*, 22(1):2009-2021.
- Zulfa, L. dan Kumalaningsih, S. 2014. Ekstraksi pewarna alami dari daun jati (*Tectona grandis*) (kajian konsentrasi asam sitrat dan lama ekstraksi) dan analisa teknno-ekonomi skala laboratorium. *Industria: Jurnal Teknologi dan Manajemen Agroindustri*, 3(1):62–72.