

REFERENCES

- Abdullah, R., Lee, P. M. and Lee, K. H. (2010) ‘Multiple color and pH stability of floral anthocyanin extract: *Clitoria ternatea*’, in *2010 International Conference on Science and Social Research (CSSR 2010)*. IEEE, pp. 254–258.
- Ana, Z. and Bertha, K. L. (2012) ‘Ekstraksi dan analisis zat warna biru (anthosianin) dari bunga telang (*Clitoria ternatea*) sebagai pewarna alami’, *Jurnal Teknologi Kimia dan Industri*. Diponegoro University, 1(1), pp. 356–365.
- Araceli, C. *et al.* (2009) ‘Chemical studies of anthocyanins: A review’, *Food Chemistry*, 113(4), pp. 859–871.
- Asen, S., Stewart, R. N. and Norris, K. H. (1972) ‘Co-pigmentation of anthocyanins in plant tissues and its effect on color’, *Phytochemistry*. Elsevier, 11(3), pp. 1139–1144.
- Asen, S., Stewart, R. N. and Norris, K. H. (1977) ‘Anthocyanin and pH in the color of ‘Heavenly Blue’morning glory’, *Phytochemistry*. Elsevier, 16(7), pp. 1118–1119.
- Askar, K. A., Alsawad, Z. H. and Khalaf, M. N. (2015) ‘Evaluation of the pH and thermal stabilities of rosella anthocyanin extracts under solar light’, *Beni-Suef University Journal of Basic and Applied Sciences*. Elsevier, 4(3), pp. 262–268.
- Aurelio, D., Edgardo, R. G. and Navarro-Galindo, S. (2008) ‘Thermal kinetic degradation of anthocyanins in a roselle (*Hibiscus sabdariffa* L. cv. “Criollo”) infusion’, *International journal of food science & technology*. Wiley Online Library, 43(2), pp. 322–325.
- Bădulescu, L. *et al.* (2019) *Drying Treatment Effects On Anthocyanins Of Organic Raspberry (Cv. Heritage) Fruit*, orgprints.org.
- Bakowska-Barczak, A. (2005) ‘Acylated anthocyanins as stable, natural food colorants—a review’, *Polish journal of food and nutrition sciences*. Citeseer, 14, p. 55.
- Bakowska-Barczak, A. M. and Kolodziejczyk, P. P. (2011) ‘Black currant polyphenols: Their storage stability and microencapsulation’, *Industrial crops and products*. Elsevier, 34(2), pp. 1301–1309.
- Barik, D. P. *et al.* (2007) ‘Rapid plant regeneration through in vitro axillary shoot proliferation of butterfly pea (*Clitoria ternatea* L.)—a twinning legume’, *In Vitro Cellular & Developmental Biology-Plant*. Springer, 43(2), pp. 144–148.
- Baskaran, A., Mudalib, S. K. A. and Izirwan, I. (2019) ‘Optimization of aqueous extraction of blue dye from butterfly pea flower’, in *Journal of Physics: Conference Series*. IOP Publishing, p. 12001.
- Betz, M. and Kulozik, U. (2011) ‘Microencapsulation of bioactive bilberry anthocyanins by means of whey protein gels’, *Procedia food science*. Elsevier, 1, pp. 2047–2056.
- Brenes, C. H., Del Pozo-Insfran, D. and Talcott, S. T. (2005) ‘Stability of copigmented anthocyanins and ascorbic acid in a grape juice model system’, *Journal of Agricultural and Food Chemistry*. ACS Publications, 53(1), pp. 49–56.

- Brouillard, R. (1983) 'The in vivo expression of anthocyanin colour in plants', *Phytochemistry*. Elsevier, 22(6), pp. 1311–1323.
- Cacace, J. E. and Mazza, G. (2002) 'Extraction of anthocyanins and other phenolics from black currants with sulfured water', *Journal of agricultural and food chemistry*. ACS Publications, 50(21), pp. 5939–5946.
- Cauchy, R. N., Santos, D. T. and Meireles, M. A. A. (2011) 'Non-thermal stabilization mechanisms of anthocyanins in model and food systems—An overview', *Food research international*. Elsevier, 44(2), pp. 499–509.
- Chance, M. J. (2018) *The Processing of Butterfly Pea (Clitoria ternatea L.) as Powder of Natural Dyes Using Maltodextrin and Soy Protein Isolate Dried By Cabinet Drying and Freeze Drying*. Unika Soegijapranata Semarang. Available at: <http://repository.unika.ac.id/17641/>.
- Cisse, M. et al. (2012) 'Impact of the extraction procedure on the kinetics of anthocyanin and colour degradation of roselle extracts during storage', *Journal of the Science of Food and Agriculture*. Wiley Online Library, 92(6), pp. 1214–1221.
- Cortez, R. et al. (2017) 'Natural pigments: stabilization methods of anthocyanins for food applications', *Comprehensive Reviews in Food Science and Food Safety*. Wiley Online Library, 16(1), pp. 180–198.
- Delgado-Vargas, F., Jiménez, A. R. and Paredes-López, O. (2000) 'Natural pigments: carotenoids, anthocyanins, and betalains—characteristics, biosynthesis, processing, and stability', *Critical reviews in food science and nutrition*. Taylor & Francis, 40(3), pp. 173–289.
- Du, C. T. and Francis, F. J. (1973) 'Anthocyanins of roselle (*Hibiscus sabdariffa*, L.)', *Journal of Food Science*. Wiley Online Library, 38(5), pp. 810–812.
- Erfan, E., Nafrialdi, N. and Purwaningsih, E. H. (2020) 'Feasibility Study of Clitoria ternatea Flower as Anthocyanin Source for Daily Food', ISSN:04532198, 62(02).
- Ersus, S. and Yurdagel, U. (2007) 'Microencapsulation of anthocyanin pigments of black carrot (*Daucus carota* L.) by spray drier', *Journal of food engineering*. Elsevier, 80(3), pp. 805–812.
- Francis, F. J. and Markakis, P. C. (1989) 'Food colorants: anthocyanins', *Critical Reviews in Food Science & Nutrition*. Taylor & Francis, 28(4), pp. 273–314.
- García-Estevez, I. et al. (2013) 'Thermodynamic and kinetic properties of a new myrtillin–vescalagin hybrid pigment', *Journal of agricultural and food chemistry*. ACS Publications, 61(47), pp. 11569–11578.
- Giusti, M. M. and Wrolstad, R. E. (2003) 'Acylated anthocyanins from edible sources and their applications in food systems', *Biochemical engineering journal*. Elsevier, 14(3), pp. 217–225.
- Gomez, S. M. and Kalamani, A. (2003) 'Butterfly pea (*Clitoria ternatea*): A nutritive multipurpose forage legume for the tropics—an overview', *Pakistan Journal of Nutrition*. Asian Network for Scientific Information, 2(6), pp. 374–379.
- Goto, T. and Kondo, T. (1991) 'Structure and molecular stacking of anthocyanins—

flower color variation', *Angewandte Chemie International Edition in English*. Wiley Online Library, 30(1), pp. 17–33.

Hamauzu, Y. (2006) 'Role and evolution of fruit phenolic compounds during ripening and storage'.

Hamouz, K. *et al.* (2018) 'Effect of growing conditions and storage on the total anthocyanin content in potatoes with coloured flesh', *Plant, Soil and Environment*, 64(9), pp. 435–440.

Hamzah, Y., Jumat, N. A. and Sembok, W. Z. 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*.

Hariadi, H. *et al.* (2018) 'Comparison of phytochemical characteristics pigmen extract (Antosianin) sweet purple potatoes powder (*Ipomoea batatas* L) and clitoria flower (*Clitoria ternatea*) as natural dye powder', *Journal of Pharmacognosy and Phytochemistry*, 7(4), pp. 3420–3429.

Harimas, J. (2017) *Evaporation as concentration treatment of butterfly pea anthocyanin and its effect to color stability*. Swiss German University. Available at: https://library.sgu.ac.id/index.php?p=show_detail&id=31555&keywords=harimas.

Hoshino, T., Matsumoto, U. and Goto, T. (1980) 'Evidences of the self-association of anthocyanins I. Circular dichroism of cyanin anhydrobase', *Tetrahedron Letters*. Elsevier, 21(18), pp. 1751–1754.

Idham, Z. *et al.* (2012) 'Effect of thermal processes on roselle anthocyanins encapsulated in different polymer matrices', *Journal of Food Processing and Preservation*. Wiley Online Library, 36(2), pp. 176–184.

Iwashina, T. *et al.* (2018) 'Anthocyanins from the Red Flowers of Meconopsis wallichii in Bhutan', *Natural Product Communications*. SAGE Publications Sage CA: Los Angeles, CA, 13(3), p. 1934578X1801300322.

Jackman, R. L. and Smith, J. L. (1996) 'Anthocyanins and betalains. Natural Food colorants', *Anthocyanins and Betalains* (Springer, New York).

Jamil, N. *et al.* (2018) 'Influences of Environmental Conditions to Phytoconstituents in *Clitoria ternatea* (Butterfly Pea Flower)–A Review', *Journal of Science and Technology*, 10(2).

Jing, P. U. *et al.* (2007) 'Effects of growing conditions on purple corncob (*Zea mays* L.) anthocyanins', *J. of Agricultural and Food Chemistry*. ACS Publications, 55(21), pp. 8625–8629.

Kazuma, K. *et al.* (2004) 'Identification of Delphinidin 3-O-(6 "-O-Malonyl)- β -glucoside-3'-O- β -glucoside, a Postulated Intermediate in the Biosynthesis of Ternatin C5 in the Blue Petals of *Clitoria ternatea* (Butterfly Pea)', *Chemistry & biodiversity*. Wiley Online Library, 1(11), pp. 1762–1770.

Kazuma, K., Noda, N. and Suzuki, M. (2003) 'Flavonoid composition related to petal color in different lines of *Clitoria ternatea*', *Phytochemistry*. Elsevier, 64(6), pp. 1133–1139.

- Khoo, H. E. et al. (2017) 'Anthocyanidins and anthocyanins: colored pigments as food, pharmaceutical ingredients, and the potential health benefits', *Food & nutrition research*. Taylor & Francis, 61(1), p. 1361779.
- Kondo, T., Ueda, M. and Goto, T. (1990) 'Structure of ternatin B1, a pentaacylated anthocyanin substituted on the B-ring asymmetrically with two long chains', *Tetrahedron*. Elsevier, 46(13–14), pp. 4749–4756.
- Kong, J.-M. et al. (2003) 'Analysis and biological activities of anthocyanins', *Phytochemistry*. Elsevier, 64(5), pp. 923–933.
- Kristamtini, K., Wiranti, E. W. and Sutarno, S. (2019) 'Variasi Warna dan Kandungan Antosianin Varietas Lokal Beras Hitam Yogyakarta pada Dua Ketinggian', *Buletin Plasma Nutfah*, 24(2), pp. 97–106.
- Lee, J. H., Lee, H.-J. and Choung, M.-G. (2011) 'Anthocyanin compositions and biological activities from the red petals of Korean edible rose (*Rosa hybrida* cv. Noblered)', *Food Chemistry*. Elsevier, 129(2), pp. 272–278.
- Lee, P. M., Abdullah, R. and Hung, L. K. (2011) 'Thermal degradation of blue anthocyanin extract of *Clitoria ternatea* flower', in *2nd International conference on biotechnology and food science IPCBEE*, pp. 49–53.
- Limsuwan, T., Paekul, N. and Ingsriwan, L. (2014) 'Effects of butterfly pea extract and flower petals on sensory, physical, chemical and microbiological characteristics of sugar-free ice cream.', *Asian Journal of Food and Agro-Industry*. King Mongkut's University of Technology Thonburi (KMUTT), 7(1), pp. 57–67.
- Luthi, M. U. L. M. Y. et al. (2018) 'A Comparative Analysis of *Clitoria ternatea* Linn.(Butterfly Pea) Flower Extract as Natural Liquid pH Indicator and Natural pH Paper', *Dhaka University Journal of Pharmaceutical Sciences*, 17(1), pp. 97–103.
- Main, J. H., Clydesdale, F. M. and Francis, F. J. (1978) 'Spray drying anthocyanin concentrates for use as food colorants', *Journal of Food Science*. Wiley Online Library, 43(6), pp. 1693–1694.
- Marpaung, A. M. et al. (2015) 'Spectral Characteristics and Color Stability of Melastomataceae and *Clitoria ternatea* L. Extracts', in *17th Food Innovation Asia Conference, Innovative ASEAN Food Research towards the World, Bangkok, Thailand*.
- Marpaung, A. M. (2017) *Stability of Intramolecular Copigmentation and Its Role on Colour Degradation of Anthocyanins from Butterfly Pea (*Clitoria ternatea* L.) Flower Extract*. Available at: <https://repository.ipb.ac.id/handle/123456789/88640>.
- Marpaung, A. M. et al. (2017) 'Thermal Degradation of Anthocyanins in Butterfly Pea (*Clitoria ternatea* L.) Flower Extract at pH 7', *American Journal of Food Science and Technology*, 5(5), pp. 199–203.
- Marpaung, A. M., Andarwulan, N. and Prangdimurti, E. (2012) 'the optimization of anthocyanin pigment extraction from butterfly pea (*clitoria ternatea* l.) Petal using response surface methodology', in *II Asia Pacific Symposium on Postharvest Research Education and Extension: APS2012 1011*, pp. 205–211.
- Martín, J. et al. (2017) *Anthocyanin pigments: Importance, sample preparation and*

extraction, Phenolic compounds—Natural sources, importance and applications. InTech. IntechOpen. Available at: <https://www.intechopen.com/books/phenolic-compounds-natural-sources-importance-and-applications/anthocyanin-pigments-importance-sample-preparation-and-extraction>.

Mastuti, E., Fristianingrum, G. and Andika, Y. (2013) *Ekstraksi dan Uji Kestabilan Warna Pigmen Antosianin dari Bunga Telang (Clitoria ternatea L.) sebagai Bahan Pewarna Makanan*. Universitas Muhammadiyah Surakarta. Available at: <https://publikasiilmiah.ums.ac.id/handle/11617/4212>.

Metivier, R. P., Francis, F. J. and Clydesdale, F. M. (1980) ‘Solvent extraction of anthocyanins from wine pomace’, *Journal of Food Science*. Wiley Online Library, 45(4), pp. 1099–1100.

Mohamad, M. F., Nasir, S. N. S. and Sarmidi, M. R. (2011) ‘Degradation kinetics and colour of anthocyanins in aqueous extracts of butterfly pea.’, *Asian journal of food and agro-industry*. King Mongkut’s University of Technology Thonburi (KMUTT), 4(5), pp. 306–315.

Mori, M., Kondo, T. and Yoshida, K. (2009) ‘Anthocyanin components and mechanism for color development in blue Veronica flowers’, *Bioscience, biotechnology, and biochemistry*. Japan Society for Bioscience, Biotechnology, and Agrochemistry, p. 909031631.

Muhammad Ezzudin, R. and Rabeta, M. S. (2018) ‘A potential of Telang tree (Clitoria ternatea) in human health’, *Food Research*, 2(5), pp. 415–420.

Mukherjee, P. K. et al. (2008) ‘The Ayurvedic medicine Clitoria ternatea—from traditional use to scientific assessment’, *Journal of ethnopharmacology*. Elsevier, 120(3), pp. 291–301.

Nikijuluw, C. and Andarwulan, N. (2013) *Color characteristic of butterfly pea (Clitoria Ternatea L.) anthocyanin extracts and brilliant blue*, Bogor Agricultural University. Available at: <https://repository.ipb.ac.id/handle/123456789/67545>.

Nuryanti, S. and Puspitasari, D. J. (2019) ‘Rosella (Hibiscus sabdariffa) Flowers as Alternative Indicators of Blue and Red Litmus’, *Oriental Journal of Chemistry*, 35(1), pp. 476–480.

Özkan, G. and Bilek, S. E. (2014) ‘Microencapsulation of natural food colourants’, *International Journal of Nutrition and Food Sciences*, 3(3), pp. 145–156.

Pedisić, S. et al. (2010) ‘Effect of maturity and geographical region on anthocyanin content of sour cherries (*Prunus cerasus* var. *marasca*).’, *Food Technology & Biotechnology*, 48(1).

Pervaiz, T. et al. (2017) ‘Naturally occurring anthocyanin, structure, functions and biosynthetic pathway in fruit plants’, *J Plant Biochem Physiol*, 5(2), pp. 1–9.

Peterson, R. G. and Jaffe, E. B. (1969) ‘Berry and fruit treating process’. Google Patents.

Pham, T. N., Lam, T. D., et al. (2019) ‘Effect of various factors on extraction efficiency of total anthocyanins from Butterfly pea (Clitoria ternatea L. Flowers) in Southern Vietnam’, in *IOP Conference Series: Materials Science and Engineering*.

IOP Publishing, p. 12013.

Pham, T. N., Nguyen, D. C., *et al.* (2019) ‘Extraction of anthocyanins from Butterfly pea (*Clitoria ternatea* L. Flowers) in Southern Vietnam: Response surface modeling for optimization of the operation conditions’, in *IOP Conference Series: Materials Science and Engineering*. IOP Publishing, p. 12032.

Philip, T. (1974) ‘An anthocyanin recovery system from grape wastes’, *Journal of Food Science*. Wiley Online Library, 39(4), p. 859.

Putri, N. I. *et al.* (2019) ‘Pengaruh Jenis Dan Konsentrasi Enkapsulan Dalam Proses Pembuatan Serbuk Antosianin Dari Kubis Merah Dan Bunga Telang’, *Jurnal Teknologi Pangan dan Gizi*, 18(1), pp. 1–9. Available at: <http://repository.unika.ac.id/18431/3/jurnal bu nov.pdf>.

Ramos, P., Herrera, R. and Moya-León, M. A. (2004) ‘Anthocyanin: Food Sources and Benefits to Consumer’s Health’.

Rein, M. (2005) *Copigmentation reactions and color stability of berry anthocyanins*. Helsingin yliopisto. Available at: <https://helda.helsinki.fi/bitstream/handle/10138/20822/copigmen.pdf>.

Roessler, E. B. *et al.* (1978) ‘Expanded statistical tables for estimating significance in paired—preference, paired—difference, duo—trio and triangle tests’, *Journal of Food Science*. Wiley Online Library, 43(3), pp. 940–943.

Sadilova, E., Carle, R. and Stintzing, F. C. (2007) ‘Thermal degradation of anthocyanins and its impact on color and in vitro antioxidant capacity’, *Molecular nutrition & food research*. Wiley Online Library, 51(12), pp. 1461–1471.

Saito, N. *et al.* (1985) ‘Acylated delphinidin glucosides and flavonols from *Clitoria ternatea*’, *Phytochemistry*, 24(7), pp. 1583–1586.

Sapiee, S. (2013) *The Extraction of Anthocyanin from Clitoria Ternatea (Blue Pea Flower) by Using Spray Dryer*. UMP. Available at: <http://umpir.ump.edu.my/id/eprint/7010/1/CD7368.pdf>.

Silva, P. I. *et al.* (2013) ‘Parameter optimization for spray-drying microencapsulation of jaboticaba (*Myrciaria jaboticaba*) peel extracts using simultaneous analysis of responses’, *Journal of Food Engineering*. Elsevier, 117(4), pp. 538–544.

Silva, S. *et al.* (2015) ‘Anthocyanin extraction from plant tissues: A review’, *Critical reviews in food science and nutrition*. Taylor & Francis, 57(14), pp. 3072–3083.

Sofyan, J. (2019) *The Evaluation of Home Industry Serving Methods Effect To The Butterfly Pea Flower Drink Characteristics*. Swiss German University. Available at: https://library.sgu.ac.id/index.php?p=show_detail&id=32607&keywords=sofyan.

Takeoka, G. and Dao, L. (2002) ‘Anthocyanins’, *Methods of analysis for functional foods and nutraceuticals*. CRC Press: Boca Raton, 1.

Tantituvanont, A. *et al.* (2008) ‘Preparation and stability of butterfly pea color extract loaded in microparticles prepared by spray drying’, *Thai Journal of Pharmaceutical Sciences*, 32(1), pp. 59–69.

Terahara, N. *et al.* (1989) ‘Structure of ternatin D1, an acylated anthocyanin from

- Clitoria ternatea flowers', *Tetrahedron letters*. Elsevier, 30(39), pp. 5305–5308.
- Terahara, Norihiko *et al.* (1990a) 'Acylated anthocyanins of Clitoria ternatea flowers and their acyl moieties', *Phytochemistry*. Elsevier, 29(3), pp. 949–953.
- Terahara, Norihiko *et al.* (1990b) 'Structure of ternatin A1, the largest ternatin in the major blue anthocyanins from Clitoria ternatea flowers', *Tetrahedron letters*. Elsevier, 31(20), pp. 2921–2924.
- Terahara, N *et al.* (1990) 'Structure of ternatin A2, one of Clitoria ternatea flower anthocyanins having the unsymmetrical side chains', *Heterocycles (Sendai)*, 31(10), pp. 1773–1776.
- Terahara, N. *et al.* (1996) 'Five new anthocyanins, ternatins A3, B4, B3, B2, and D2, from Clitoria ternatea flowers', *Journal of natural products*. ACS Publications, 59(2), pp. 139–144.
- Terahara, N. *et al.* (1998) 'Eight New Anthocyanins, Ternatins C1–C5 and D3 and Preternatins A3 and C4 from Young Clitoria ternatea Flowers', *Journal of natural products*. ACS Publications, 61(11), pp. 1361–1367.
- Thanh, V. T. *et al.* (2020) 'Application of anthocyanin natural colors from Butterfly Pea (Clitoria ternatea L.) extracts to cupcake', *MS&E*, 736(6), p. 62014.
- Trouillas, P. *et al.* (2016) 'Stabilizing and modulating color by copigmentation: insights from theory and experiment', *Chemical reviews*. ACS Publications, 116(9), pp. 4937–4982.
- Tulyathan, V., Duangmal, K. and Thunpittayakul, C. (1993) 'Anthocyanin extractive from blue pea flowers (Clitoria ternatea L.)', *Thai Journal of Agricultural Science (Thailand)*.
- Valduga, E. *et al.* (2008) 'Extraction, spray drying and microencapsulating of Isabel'grape (Vitis labrusca) bagasse anthocyanin', *Ciência e Agrotecnologia*. Univ Federal Lavras-UFLA Caixa Postal 3037, Lavras, MG 37200-000,Brazil, 32(5), 32(5), pp. 1568–1574.
- Wang, W.-D. and Xu, S.-Y. (2007) 'Degradation kinetics of anthocyanins in blackberry juice and concentrate', *Journal of food engineering*. Elsevier, 82(3), pp. 271–275.
- Wu, H.-Y., Yang, K.-M. and Chiang, P.-Y. (2018) 'Roselle anthocyanins: Antioxidant properties and stability to heat and pH', *Molecules*. Multidisciplinary Digital Publishing Institute, 23(6), p. 1357.
- Yoshida, K., Mori, M. and Kondo, T. (2009) 'Blue flower color development by anthocyanins: from chemical structure to cell physiology', *Natural product reports*. Royal Society of Chemistry, 26(7), pp. 884–915.
- Zhao, D. and Tao, J. (2015) 'Recent advances on the development and regulation of flower color in ornamental plants', *Frontiers in plant science*. Frontiers, 6, p. 261.
- Zingare, M. L. *et al.* (2013) 'Clitoria ternatea (Aparajita): a review of the antioxidant, antidiabetic and hepatoprotective potentials', *Int J Pharm Biol Sci*, 3, pp. 203–213.