



DAFTAR PUSTAKA

- Abbe Maleyki, M.J. and Ismail, A. (2010), “Antioxidant properties of cocoa powder”, *Journal of Food Biochemistry*, Vol. 34 No. 1, pp. 111–128.
- Abu, F., Mat Taib, C.N., Mohd Moklas, M.A. and Mohd Akhir, S. (2017), “Antioxidant Properties of Crude Extract, Partition Extract, and Fermented Medium of Dendrobium sabin Flower”, *Evidence-Based Complementary and Alternative Medicine*, Vol. 2017, pp. 1–9.
- Adamson, G.E., Lazarus, S.A., Mitchell, A.E., Prior, R.L., Cao, G., Jacobs, P.H., Kremers, B.G., et al. (1999), “HPLC method for the quantification of procyanidins in cocoa and chocolate samples and correlation to total antioxidant capacity”, *Journal of Agricultural and Food Chemistry*, Vol. 47 No. 10, pp. 4184–4188.
- Adedayo, B.C., Oboh, G., Oyeleye, S.I., Ejakpovi, I.I., Boligon, A.A. and Athayde, M.L. (2015), “Blanching alters the phenolic constituents and in vitro antioxidant and anticholinesterases properties of fireweed (*Crassocephalum crepidioides*)”, *Journal of Taibah University Medical Sciences*, Elsevier Ltd, Vol. 10 No. 4, pp. 419–426.
- Adjimani, J.P. and Asare, P. (2015), “Antioxidant and free radical scavenging activity of iron chelators”, *Toxicology Reports*, Elsevier Ireland Ltd, Vol. 2, pp. 721–728.
- Afoakwa, E.O., Kongor, J.E., Takrama, J.F., Budu, A.S. and Mensah-Brown, H. (2013), “Effects of pulp preconditioning on total polyphenols, O-diphenols and anthocyamin concentrations during fermentation and drying of cocoa (*Theobroma cacao*) beans.”, *Journal of Food Science and Engineering*, Vol. 3 No. 5, pp. 235–245.
- Afoakwa, E.O., Quao, J., Takrama, F.S., Budu, A.S. and Saalia, F.K. (2012), “Changes in total polyphenols, o-diphenols and anthocyanin concentrations during fermentation of pulp pre-conditioned cocoa (*Theobroma cacao*) beans”, *International Food Research Journal*, Vol. 19 No. 3, pp. 1071–1077.
- Aikpokpodion, P.E. and Dongo, L.N. (2010), “Effects of Fermentation Intensity on Polyphenols and Antioxidant Capacity”, *International Journal of Sustainable Crop Production*, Vol. 5 No. 4, pp. 66–70.
- Akhter, K.F. (2012), “Nanoencapsulation of Protein Drug for Controlled Release”, *Journal of Physical Chemistry & Biophysics*, Vol. S11 No. 01, pp. 1–5.
- Ali, F., Ranneh, Y., Ismail, A. and Esa, N.M. (2015), “Identification of phenolic compounds in polyphenols-rich extract of Malaysian cocoa powder using the HPLC-UV-ESI—MS/MS and probing their antioxidant properties”, *Journal of Food Science and Technology*, Vol. 52 No. 4, pp. 2103–2111.
- Altunkaya, A. (2014), “Partial purification and characterization of polyphenoloxidase from Turkish tea leaf (*Camellia Sinensis L.*)”, *International Journal of Food Properties*, Taylor & Francis, Vol. 17 No. 7, pp. 1490–1497.
- Alvim, I.D. and Grosso, C.R.F. (2010), “Microparticles obtained by complex



- coacervation: influence of the type of reticulation and the drying process on the release of the core material”, *Ciência e Tecnologia de Alimentos*, Vol. 30 No. 4, pp. 1069–1076.
- Amic, D., Davidovic-Amic, D., Beslo, D., Rastija, V., Lucic, B. and Trinajstic, N. (2007), “SAR and QSAR of the Antioxidant Activity of Flavonoids”, *Current Medicinal Chemistry*, Vol. 14 No. 7, pp. 827–845.
- Amić, D. and Lučić, B. (2010), “Reliability of bond dissociation enthalpy calculated by the PM6 method and experimental TEAC values in antiradical QSAR of flavonoids”, *Bioorganic and Medicinal Chemistry*, Vol. 18 No. 1, pp. 28–35.
- Aprotosoaie, A., Miron, A., Trifan, A., Luca, V. and Costache, I.-I. (2016), “The Cardiovascular Effects of Cocoa Polyphenols—An Overview”, *Diseases*, Vol. 4 No. 4, p. 39.
- Aprotosoaie, A.C., Luca, S.V. and Miron, A. (2016), “Flavor Chemistry of Cocoa and Cocoa Products-An Overview”, *Comprehensive Reviews in Food Science and Food Safety*, Vol. 15 No. 1, pp. 73–91.
- Araujo-Díaz, S.B., Leyva-Porras, C., Aguirre-Bañuelos, P., Álvarez-Salas, C. and Saavedra-Leos, Z. (2017), “Evaluation of the physical properties and conservation of the antioxidants content, employing inulin and maltodextrin in the spray drying of blueberry juice”, *Carbohydrate Polymers*, Vol. 167, pp. 317–325.
- Arroqui, C., Lopez, A., Esnoz, A. and Virseda, P. (2003), “Mathematical model of heat transfer and enzyme inactivation in an integrated blancher cooler”, *Journal of Food Engineering*, Vol. 58 No. 3, pp. 215–225.
- Arroqui, C., Rumsey, T.R., Lopez, A. and Virseda, P. (2001), “Effect of different soluble solids in the water on the ascorbic acid losses during water blanching of potato tissue”, *Journal of Food Engineering*, Vol. 47 No. 2, pp. 123–126.
- Arroyo-Maya, I.J., Rodiles-López, J.O., Cornejo-Mazón, M., Gutiérrez-López, G.F., Hernández-Arana, A., Toledo-Núñez, C., Barbosa-Cánovas, G.V., et al. (2012), “Effect of different treatments on the ability of α -lactalbumin to form nanoparticles”, *Journal of Dairy Science*, Elsevier, Vol. 95 No. 11, pp. 6204–6214.
- Arteel, G.E. and Sies, H. (1999), “Protection against peroxynitrite by cocoa polyphenol oligomers”, *FEBS Letters*, Vol. 462 No. 1–2, pp. 167–170.
- Aswal, V.K. and Kohlbrecher, J. (2005), “Synthesis of Gelatin Nanoparticles via Simple Coacervation”, *Journal of Surface Science and Technology*, Vol. 21 No. 3, pp. 149–160.
- Azam, S., Hadi, N., Khan, N.U. and Hadi, S.M. (2003), “Antioxidant and prooxidant properties of caffeine, theobromine and xanthine.”, *Medical Science Monitor : International Medical Journal of Experimental and Clinical Research*, Vol. 9 No. 9, pp. BR325-R330.
- Azarmi, S., Huang, Y., Chen, H., McQuarrie, S., Abrams, D., Roa, W., Finlay, W.H., et al. (2006), “Optimization of a two-step desolvation method for preparing gelatin nanoparticles and cell uptake studies in 143B osteosarcoma cancer cells”, *Journal of Pharmacy and Pharmaceutical Sciences*, Vol. 9 No. 1, pp. 124–132.



- Barbé, C., Bartlett, J., Kong, L., Finnie, K., Lin, H.Q., Larkin, M., Calleja, S., et al. (2004), "Silica particles: A novel drug-delivery system", *Advanced Materials*, Vol. 16 No. 21, pp. 1959–1966.
- Barbosa, M.I.M.J., Borsarelli, C.D. and Mercadante, A.Z. (2005), "Light stability of spray-dried bixin encapsulated with different edible polysaccharide preparations", *Food Research International*, Vol. 38 No. 8–9, pp. 989–994.
- Bareras-Urbina, C.G., Ramírez-Wong, B., López-Ahumada, G.A., Burruel-Ibarra, S.E., Martínez-Cruz, O., Tapia-Hernández, J.A. and Rodríguez Félix, F. (2016), "Nano- and Micro-Particles by Nanoprecipitation: Possible Application in the Food and Agricultural Industries", *International Journal of Food Properties*, Taylor & Francis, Vol. 19 No. 9, pp. 1912–1923.
- Batista, N.N., de Andrade, D.P., Ramos, C.L., Dias, D.R. and Schwan, R.F. (2016), "Antioxidant capacity of cocoa beans and chocolate assessed by FTIR", *Food Research International*, Elsevier Ltd, Vol. 90, pp. 313–319.
- Bhattacharjee, S. (2016), "DLS and zeta potential - What they are and what they are not?", *Journal of Controlled Release*, Elsevier B.V., Vol. 235, pp. 337–351.
- Bhowmik, M., Kumari, P., Sarkar, G., Bain, M.K., Bhowmick, B., Mollick, M.M.R., Mondal, D., et al. (2013), "Effect of xanthan gum and guar gum on in situ gelling ophthalmic drug delivery system based on poloxamer-407", *International Journal of Biological Macromolecules*, Elsevier B.V., Vol. 62, pp. 117–123.
- Bilati, U., Allémann, E. and Doelker, E. (2005), "Development of a nanoprecipitation method intended for the entrapment of hydrophilic drugs into nanoparticles", *European Journal of Pharmaceutical Sciences*, Vol. 24 No. 1, pp. 67–75.
- Bilati, U., Allémann, E. and Doelker, E. (2006), "Nanoprecipitation versus emulsion-based techniques for the encapsulation of proteins into biodegradable nanoparticles and process-related stability issues", *AAPS PharmSciTech*, Vol. 6 No. 4, pp. E594–E604.
- Botrel, D.A., Borges, S.V., Fernandes, R.V. de B., Antoniassi, R., de Faria-Machado, A.F., Feitosa, J.P. de A. and de Paula, R.C.M. (2017), "Application of cashew tree gum on the production and stability of spray-dried fish oil", *Food Chemistry*, Elsevier Ltd, Vol. 221, pp. 1522–1529.
- de Brito, E.S., Garcia, N.H.P., Gallao, M.I., Cortelazzo, A.L., Fevereiro, P.S. and Braga, M.R. (2004), "Structural and chemical changes in cocoa (*Theobroma cacao L.*) during fermentation, drying and roasting", *Journal of the Science of Food and Agriculture*, Vol. 81, pp. 281–288.
- Brown, J.E., Khodr, H., Hider, R.C. and Rice-evans, C.A. (1998), "Structural dependence of flavonoid interactions with Cu²⁺ ions: implications for their antioxidant properties", *Biochemical Journal*, Vol. 330, pp. 1173–1178.
- Bruschi, M.L., Borghi-Pangoni, F.B., Junqueira, M. V. and de Souza Ferreira, S.B. (2017), *Nanostructured Therapeutic Systems with Bioadhesive and Thermoresponsive Properties, Nanostructures for Novel Therapy: Synthesis, Characterization and Applications*, Elsevier Inc., available at:<https://doi.org/10.1016/B978-0-323-46142-9.00012-8>.



- Burda, S. and Oleszek, W. (2001), "Antioxidant and Antiradical Activities of Flavonoids", *Journal of Agricultural and Food Chemistry*, Vol. 49, pp. 2774–2779.
- Busch, V.M., Pereyra-Gonzalez, A., Šegatin, N., Santagapita, P.R., Poklar Ulrich, N. and Buera, M.P. (2017), "Propolis encapsulation by spray drying: Characterization and stability", *LWT - Food Science and Technology*, Vol. 75, pp. 227–235.
- Camu, N., De Winter, T., Addo, S.K., Takrama, J.S., Bernaert, H. and De Vuyst, L. (2008), "Fermentation of cocoa beans: influence of microbial activities and polyphenol concentrations on the flavour of chocolate", *Revista de Fitoterapia*, Vol. 88, pp. 2288–2297.
- Cano-Chauca, M., Stringheta, P.C., Ramos, A.M. and 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*, Vol. 6 No. 4, pp. 420–428.
- Castellani, O., Guibert, D., Al-Assaf, S., Axelos, M., Phillips, G.O. and Anton, M. (2010), "Hydrocolloids with emulsifying capacity. Part 1 - Emulsifying properties and interfacial characteristics of conventional (Acacia senegal (L.) Willd. var. senegal) and matured (Acacia (sen) SUPER GUM™) Acacia senegal", *Food Hydrocolloids*, Elsevier Ltd, Vol. 24 No. 2–3, pp. 193–199.
- Cháfer, M., González-Martínez, C., Fernández, B., Pérez, L. and Chiralt, A. (2003), "Effect of blanching and vacuum pulse application on osmotic dehydration of pear", *Food Science and Technology International*, Vol. 9 No. 5, pp. 321–328.
- Chen, L., Remondetto, G.E. and Subirade, M. (2006), "Food protein-based materials as nutraceutical delivery systems", *Trends in Food Science and Technology*, Vol. 17 No. 5, pp. 272–283.
- Chen, Q., Shi, H. and Ho, C.T. (1992), "Effects of rosemary extracts and major constituents on lipid oxidation and soybean lipoxygenase activity", *Journal of the American Oil Chemists' Society*, Vol. 69 No. 10, pp. 999–1002.
- Cheng, C.M., Jalil, A.M.M. and Ismail, A. (2009), "Phenolic and theobromine contents of commercial dark, milk and white chocolates on the Malaysian market", *Molecules*, Vol. 14 No. 1, pp. 200–209.
- Chew, K.K., Khoo, M.Z., Ng, S.Y., Thoo, Y.Y., Wan Aida, W.M. and Ho, C.W. (2011), "Effect of ethanol concentration , extraction time and extraction temperature on the recovery of phenolic compounds and antioxidant capacity of Orthosiphon stamineus extracts", *International Food Research Journal*, Vol. 18 No. 4, pp. 1427–1435.
- Chew, Y.L., Goh, J.K. and Lim, Y.Y. (2009), "Assessment of in vitro antioxidant capacity and polyphenolic composition of selected medicinal herbs from Leguminosae family in Peninsular Malaysia", *Food Chemistry*, Elsevier Ltd, Vol. 116 No. 1, pp. 13–18.
- Chin, E., Miller, K.B., Payne, M.J., Hurst, W.J. and Stuart, D.A. (2013), "Comparison of antioxidant activity and flavanol content of cacao beans processed by modern and traditional Mesoamerican methods", *Heritage Science*, Vol. 1 No. 1, p. 9.
- Choi, M.H., Kim, G.H. and Lee, H.S. (2002), "Effects of ascorbic acid retention on



- juice color and pigment stability in blood orange (*Citrus sinensis*) juice during refrigerated storage”, *Food Research International*, Vol. 35 No. 8, pp. 753–759.
- Choubey, J. and Bajpai, A.K. (2010), “Investigation on magnetically controlled delivery of doxorubicin from superparamagnetic nanocarriers of gelatin crosslinked with genipin”, *Journal of Materials Science: Materials in Medicine*, Vol. 21 No. 5, pp. 1573–1586.
- Claeys, W.L., Schmit, J.F., Bragard, C., Maghuin-Rogister, G., Pussemier, L. and Schiffers, B. (2011), “Exposure of several Belgian consumer groups to pesticide residues through fresh fruit and vegetable consumption”, *Food Control*, Elsevier Ltd, Vol. 22 No. 3–4, pp. 508–516.
- Couret, C. and Collin, S. (2003), “Effect of the Number of Flavanol Units on the Antioxidant Activity of Procyanolidin Fractions Isolated from Chocolate”, *Journal of Agricultural and Food Chemistry*, Vol. 51 No. 23, pp. 6816–6822.
- Dag, D., Kilercioglu, M. and Oztop, M.H. (2017), “Physical and chemical characteristics of encapsulated goldenberry (*Physalis peruviana* L.) juice powder”, *LWT - Food Science and Technology*, Elsevier Ltd, Vol. 83, pp. 86–94.
- Desai, M.P., Labhsetwar, V., Walter, E., Levy, R.J. and Amidon, G.L. (1997), “The mechanism of uptake of biodegradable microparticles in cacao-2 cells is size dependent”, *Pharmaceutical Research*, Vol. 14 No. 11, pp. 1568–1573.
- Devi, N., Sarmah, M., Khatun, B. and Maji, T.K. (2017), “Encapsulation of active ingredients in polysaccharide–protein complex coacervates”, *Advances in Colloid and Interface Science*, Elsevier B.V., Vol. 239, pp. 136–145.
- Diaz, D.I., Beristain, C.I., Azuara, E., Luna, G. and Jimenez, M. (2015), “Effect of wall material on the antioxidant activity and physicochemical properties of *Rubus fruticosus* juice microcapsules”, *Journal of Microencapsulation*, Informa UK Ltd, Vol. 32 No. 3, pp. 247–254.
- Dorantes-Alvarez, L., Jaramillo-Flores, E., González, K., Martínez, R. and Parada, L. (2011), “Blanching peppers using microwaves”, *Procedia Food Science*, Elsevier Srl, Vol. 1, pp. 178–183.
- Dorđević, V., Balanč, B., Belščak-Cvitanović, A., Lević, S., Trifković, K., Kalušević, A., Kostić, I., et al. (2014), *Trends in Encapsulation Technologies for Delivery of Food Bioactive Compounds*, *Food Engineering Reviews*, Vol. 7, available at:<https://doi.org/10.1007/s12393-014-9106-7>.
- Dorman, H.J.D. and Hiltunen, R. (2004), “Fe(III) reductive and free radical-scavenging properties of summer savory (*Satureja hortensis* L.) extract and subfractions”, *Food Chemistry*, Vol. 88 No. 2, pp. 193–199.
- Durling, N.E., Catchpole, O.J., Grey, J.B., Webby, R.F., Mitchell, K.A., Foo, L.Y. and Perry, N.B. (2007), “Extraction of phenolics and essential oil from dried sage (*Salvia officinalis*) using ethanol-water mixtures”, *Food Chemistry*, Vol. 101 No. 4, pp. 1417–1424.
- Ebrahimzadeh, M.A., Seyed Mohammad, N. and Seyed Fazel, N. (2009), “Correlation between the in vitro iron chelating activity and polyphenol and flavonoid contents of some medicinal plant”, *Pakistan Journal of Biological Sciences*, Vol. 12 No. 12, pp. 934–938.



- El-Housiny, S., Eldeen, M.A.S., El-Attar, Y.A., Salem, H.A., Attia, D., Bendas, E.R. and El-Nabarawi, M.A. (2018), “Fluconazole-loaded solid lipid nanoparticles topical gel for treatment of pityriasis versicolor: Formulation and clinical study”, *Drug Delivery*, Informa Healthcare USA, Inc, Vol. 25 No. 1, pp. 78–90.
- El-Shabouri, M.H. (2002), “Positively charged nanoparticles for improving the oral bioavailability of cyclosporin-A”, *International Journal of Pharmaceutics*, Vol. 249, pp. 101–108.
- Elzoghby, A.O. (2013), “Gelatin-based nanoparticles as drug and gene delivery systems: Reviewing three decades of research”, *Journal of Controlled Release*, Elsevier B.V., Vol. 172 No. 3, pp. 1075–1091.
- Erlejman, A.G., Fraga, C.G. and Oteiza, P.I. (2006), “Procyanidins protect Caco-2 cells from bile acid- and oxidant-induced damage”, *Free Radical Biology and Medicine*, Vol. 41 No. 8, pp. 1247–1256.
- Estevinho, B.N., Rocha, F., Santos, L. and Alves, A. (2013), “Microencapsulation with chitosan by spray drying for industry applications - A review”, *Trends in Food Science and Technology*, Vol. 31 No. 2, pp. 138–155.
- Fang, Z. and Bhandari, B. (2010), “Encapsulation of polyphenols - A review”, *Trends in Food Science and Technology*, Vol. 21 No. 10, pp. 510–523.
- Faridi Esfanjani, A. and Jafari, S.M. (2016), “Biopolymer nano-particles and natural nano-carriers for nano-encapsulation of phenolic compounds”, *Colloids and Surfaces B: Biointerfaces*, Elsevier B.V., Vol. 146, pp. 532–543.
- Farrugia, C.A. and Groves, Mi.J. (1999), “Gelatin Behaviour in Dilute Aqueous Solution: Designing a Nanoparticulate Formulation”, *Journal of Pharmacy and Pharmacology*, Vol. 51 No. 6, pp. 643–649.
- Fatnassi, M., Tourné-Péteilh, C., Peralta, P., Cacciaguerra, T., Dieudonné, P., Devoisselle, J.M. and Alonso, B. (2013), “Encapsulation of complementary model drugs in spray-dried nanostructured materials”, *Journal of Sol-Gel Science and Technology*, Vol. 68 No. 2, pp. 307–316.
- Ferrali, M., Signorini, C., Caciotti, B., Sugherini, L., Ciccoli, L., Giachetti, D. and Comporti, M. (1997), “Protection against oxidative damage of erythrocyte membrane by the flavonoid quercetin and its relation to iron chelating activity”, *FEBS Letters*, Vol. 416 No. 2, pp. 123–129.
- Firuzi, O., Lacanna, A., Petrucci, R., Marrosu, G. and Saso, L. (2005), “Evaluation of the antioxidant activity of flavonoids by ‘ferric reducing antioxidant power’ assay and cyclic voltammetry”, *Biochimica et Biophysica Acta - General Subjects*, Vol. 1721 No. 1–3, pp. 174–184.
- Firuzi, O., Mladenka, P., Petrucci, R., Marrosu, G. and Saso, L. (2004), “Hypochlorite scavenging in activity of flavonoids”, *Journal of Pharmacy and Pharmacology*, Vol. 56 No. 6, pp. 801–807.
- Food and Drug Administration. (2018), “Food additives permitted for direct addition to food for human consumption”, *Electronic Code of Federal Regulations*.
- Fraga, C.G., Actis-Goretta, L., Ottaviani, J.I., Carrasquedo, F., Lotito, S.B., Lazarus, S., Schmitz, H.H., et al. (2005), “Regular consumption of a flavanol-rich chocolate can improve oxidant stress in young soccer players”, *Clinical*



- and Developmental Immunology*, Vol. 12 No. 1, pp. 11–17.
- Friess, W. (1998), “Review Article. Collagen-biomaterial for drug delivery.”, *European Journal of Pharmaceutics and Biopharmaceutics*, Vol. 45 No. 2, pp. 113–136.
- Fukumoto, L.R. and Mazza, G. (2000), “Assessing antioxidant and prooxidant activities of phenolic compounds”, *Journal of Agricultural and Food Chemistry*, Vol. 48 No. 8, pp. 3597–3604.
- Furniss, B.S., Hannaford, A.J., Smith, P.W.G. and Tatchell, A.R. (1999), *Textbook of Practical Organic Chemistry*, Fifth edit., Longman Scientific & Technical, New Yor.
- Ganachaud, F. and Katz, J.L. (2005), “Nanoparticles and nanocapsules created using the ouzo effect: Spontaneous emulsification as an alternative to ultrasonic and high-shear devices”, *ChemPhysChem*, Vol. 6 No. 2, pp. 209–216.
- Garrote, R.L., Silva, E.R., Bertone, R.A. and Avalle, A. (1997), “Effect of Time and Number of Cycles on Yield and Peeling Quality of Steam Peeled Potatoes and Asparagus”, *LWT - Food Science and Technology*, Vol. 30 No. 5, pp. 448–451.
- Gharsallaoui, A., Roudaut, G., Chambin, O., Voilley, A. and Saurel, R. (2007), “Applications of spray-drying in microencapsulation of food ingredients: An overview”, *Food Research International*, Vol. 40 No. 9, pp. 1107–1121.
- Gilttekin-Özgïven, M., Berktaş, I. and Özçelik, B. (2016), “Change in stability of procyanidins, antioxidant capacity and in-vitro bioaccessibility during processing of cocoa powder from cocoa beans”, *LWT - Food Science and Technology*, Vol. 72, pp. 559–565.
- Giuliano, E., Paolino, D., Fresta, M. and Cosco, D. (2018), “Mucosal Applications of Poloxamer 407-Based Hydrogels: An Overview”, *Pharmaceutics*, Vol. 10 No. 3, p. 159.
- Gliszczyńska-Świglo, A., Ciska, E., Pawlak-Lemańska, K., Chmielewski, J., Borkowski, T. and Tyrakowska, B. (2006), “Changes in the content of health-promoting compounds and antioxidant activity of broccoli after domestic processing”, *Food Additives and Contaminants*, Vol. 23 No. 11, pp. 1088–1098.
- Gocho, H., Shimizu, H., Tanioka, A., Chou, T.J. and Nakajima, T. (2000), “Effect of polymer chain end on sorption isotherm of water by chitosan”, *Carbohydrate Polymers*, Vol. 41 No. 1, pp. 87–90.
- Gonçalves, E.M., Pinheiro, J., Abreu, M., Brandão, T.R.S. and Silva, C.L.M. (2010), “Carrot (*Daucus carota L.*) peroxidase inactivation, phenolic content and physical changes kinetics due to blanching”, *Journal of Food Engineering*, Elsevier Ltd, Vol. 97 No. 4, pp. 574–581.
- Gordon, M.H. (1990), “The mechanism of antioxidant action in vitro”, in Hudson, B.F.. (Ed.), *Food Antioxidants*, Springer Netherlands, pp. 1–18.
- Goula, A.M. and Adamopoulos, K.G. (2004), “Spray drying of tomato pulp: Effect of feed concentration”, *Drying Technology*, Vol. 22 No. 10, pp. 2309–2330.
- Guehi, T.S., Zahouli, I.B., Ban-Koffi, L., Fae, M.A. and Nemlin, J.G. (2010), “Performance of different drying methods and their effects on the chemical



- quality attributes of raw cocoa material”, *International Journal of Food Science and Technology*, Vol. 45 No. 8, pp. 1564–1571.
- Gül, A. and Pehlivan, T. (2018), “Antioxidant activities of some monofloral honey types produced across Turkey”, *Saudi Journal of Biological Sciences*, Elsevier, Vol. 25 No. 6, pp. 1056–1065.
- Gupta, A.K., Gupta, M., Yarwood, S.J. and Curtis, A.S.G. (2004), “Effect of cellular uptake of gelatin nanoparticles on adhesion, morphology and cytoskeleton organisation of human fibroblasts”, *Journal of Controlled Release*, Vol. 95 No. 2, pp. 197–207.
- Hall C. A. and Cuppet S. L. (1997), *Antioxidant Methodology: In Vivo and in Vitro Concepts*, edited by Aruoma, O.I. and Cuppett, S.L., AOAC Press, Champaign, Illionis, available at: <http://books.google.com/books?hl=it&lr=&id=tnyEBXXEJkgC&pgis=1>.
- Hammerstone, J.F., Lazarus, S.A., Mitchell, A.E., Rucker, R. and Schmitz, H.H. (1999), “Identification of procyanidins in cocoa (*Theobroma cacao*) and chocolate using high-performance liquid chromatography/mass spectrometry”, *Journal of Agricultural and Food Chemistry*, Vol. 47 No. 2, pp. 490–496.
- Han, H.J., Lee, J.S., Park, S.A., Ahn, J.B. and Lee, H.G. (2015), “Extraction optimization and nanoencapsulation of jujube pulp and seed for enhancing antioxidant activity”, *Colloids and Surfaces B: Biointerfaces*, Elsevier B.V., Vol. 130, pp. 93–100.
- Hasrini, R.F., Zakaria, F.R., Adawiyah, D.R. and Suparto, I.H. (2017), “Mikroenkapsulasi Minyak Sawit Mentah Dengan Penyalut Maltodekstrin Dan Isolat Protein Kedelai”, *Jurnal Teknologi Dan Industri Pangan*, Vol. 28 No. 1, pp. 10–19.
- Honary, S., Ebrahimi, P. and Hadianamrei, R. (2014), “Optimization of particle size and encapsulation efficiency of vancomycin nanoparticles by response surface methodology”, *Pharmaceutical Development and Technology*, Vol. 19 No. 8, pp. 987–998.
- Hu, S.J., Kim, B.Y. and Baik, M.Y. (2016), “Physicochemical properties and antioxidant capacity of raw, roasted and puffed cacao beans”, *Food Chemistry*, Vol. 194, pp. 1089–1094.
- Indiarto, R., Pranoto, Y., Santoso, U. and . S. (2019), “Evaluation of Physicochemical Properties and Antioxidant Activity of Polyphenol-Rich Cacao Bean Extract Through Water Blanching”, *Pakistan Journal of Nutrition*, Vol. 18 No. 3, pp. 278–287.
- Ioannou, I. and Ghoul, M. (2012), “Biological activities and effects of food processing on flavonoids as phenolics antioxidants”, in Marian Petre (Ed.), *Advances in Applied Biotechnology*, In Tech Open, pp. 101–124.
- Islam Shishir, M.R., Taip, F.S., Aziz, N.A., Talib, R.A. and Hossain Sarker, M.S. (2016), “Optimization of spray drying parameters for pink guava powder using RSM”, *Food Science and Biotechnology*, Vol. 25 No. 2, pp. 461–468.
- Jalil, A.M.M. and Ismail, A. (2008), “Polyphenols in cocoa and cocoa products: Is there a link between antioxidant properties and health?”, *Molecules*, Vol. 13 No. 9, pp. 2190–2219.



- Jinap, M.S., Jamilah, B. and Nazamid, S. (2004), "Effect of polyphenol concentration on pyrazine formation during cocoa liquor roasting", *Food Chemistry*, Vol. 85 No. 1, pp. 73–80.
- Kabanov, A. V, Batrakova, E. V and Miller, D.W. (2003), "Pluronic block copolymers as modulators of drug efflux transporter activity in the blood-barrier", *Advanced Drug Delivery Reviews*, Vol. 55, pp. 151–164.
- Kanakdande, D., Bhosale, R. and Singhal, R.S. (2007), "Stability of cumin oleoresin microencapsulated in different combination of gum arabic, maltodextrin and modified starch", *Carbohydrate Polymers*, Vol. 67 No. 4, pp. 536–541.
- Kandansamy, K. and Somasundaram, P.D. (2012), "Microencapsulation of colors by spray drying-A review", *International Journal of Food Engineering*, Vol. 8 No. 2, available at:<https://doi.org/10.1515/1556-3758.2647>.
- Keen, C.L. (2001), "Chocolate: Food as Medicine/Medicine as Food", *Journal of the American College of Nutrition*, Vol. 20 No. September, pp. 436S-439S.
- Kelly, E.H., Dennis, J.B. and Anthony, R.T. (2002), "Flavonoid antioxidants: chemistry, metabolism and structure-activity relationships", *Journal of Nutritional Biochemistry*, Vol. 13, pp. 572–584.
- Kha, T.C., Nguyen, M.H. and Roach, P.D. (2010), "Effects of spray drying conditions on the physicochemical and antioxidant properties of the Gac (*Momordica cochinchinensis*) fruit aril powder", *Journal of Food Engineering*, Elsevier Ltd, Vol. 98 No. 3, pp. 385–392.
- Khan, S.A. and Schneider, M. (2013), "Improvement of Nanoprecipitation Technique for Preparation of Gelatin Nanoparticles and Potential Macromolecular Drug Loading", *Macromolecular Bioscience*, Vol. 13 No. 4, pp. 455–463.
- Khan, S.A. and Schneider, M. (2014), "Stabilization of gelatin nanoparticles without crosslinking", *Macromolecular Bioscience*, Vol. 14 No. 11, pp. 1627–1638.
- Khokhar, S. and Owusu Apenten, R.K. (2003), "Iron binding characteristics of phenolic compounds: Some tentative structure-activity relations", *Food Chemistry*, Vol. 81 No. 1, pp. 133–140.
- Kommareddy, S., Shenoy, D.B. and Amiji, M.M. (2007), "Gelatin Nanoparticles and Their Biofunctionalization", *Nanotechnologies for the Life Sciences*, Vol. 1, pp. 330–352.
- Kongor, J.E., Hinneh, M., Van de Walle, D., Afoakwa, E.O., Boeckx, P. and Dewettinck, K. (2016), "Factors influencing quality variation in cocoa (*Theobroma cacao*)bean flavour profile — A review", *Food Research International*, Elsevier Ltd, Vol. 82, pp. 44–52.
- Krishna Sailaja, A. and Amareshwar, P. (2012), "Preparation of BSA nanoparticles by desolvation technique using acetone as desolvating agent", *Asian Journal of Pharmaceutical and Clinical Research*, Vol. 5 No. 2, pp. 132–134.
- Krishnan, S., Kshirsagar, A.C. and Singhal, R.S. (2005), "The use of gum arabic and modified starch in the microencapsulation of a food flavoring agent", *Carbohydrate Polymers*, Vol. 62 No. 4, pp. 309–315.
- Kurosawa, T., Itoh, F., Nozaki, A., Nakano, Y., Katsuda, S.I., Osakabe, N.,



- Tsubone, H., et al. (2005), "Suppressive effects of cacao liquor polyphenols (CLP) on LDL oxidation and the development of atherosclerosis in Kurosawa and Kusanagi-hypercholesterolemic rabbits", *Atherosclerosis*, Vol. 179 No. 2, pp. 237–246.
- De La Vega-Miranda, B., Santiesteban-López, N.A., López-Malo, A. and Sosa-Morales, M.E. (2012), "Inactivation of *Salmonella Typhimurium* in fresh vegetables using water-assisted microwave heating", *Food Control*, Elsevier Ltd, Vol. 26 No. 1, pp. 19–22.
- Lai, L., Chou, S. and Chao, W. (2001), "Studies on the Antioxidative Activities of Hsian-tsao ()", *Journal of Agricultural and Food Chemistry*, Vol. 49 No. 2, pp. 963–968.
- Lai, P., Daear, W., Löbenberg, R. and Prenner, E.J. (2014), "Overview of the preparation of organic polymeric nanoparticles for drug delivery based on gelatine, chitosan, poly(d,l-lactide-co-glycolic acid) and polyalkylcyanoacrylate", *Colloids and Surfaces B: Biointerfaces*, Elsevier B.V., Vol. 118, pp. 154–163.
- Lamuela-Raventós, R.M., Andrés-Lacueva, C., Permanyer, J. and Izquierdo-Pulido, M. (2001), "More antioxidants in cocoa", *The Journal of Nutrition*, Vol. 131 No. 3, pp. 834–835.
- Lee, E.J., Khan, S.A. and Lim, K.H. (2011), "Gelatin nanoparticle preparation by nanoprecipitation", *Journal of Biomaterials Science, Polymer Edition*, Vol. 22 No. 4–6, pp. 753–771.
- Lee, E.J., Khan, S.A., Park, J.K. and Lim, K.H. (2012), "Studies on the characteristics of drug-loaded gelatin nanoparticles prepared by nanoprecipitation", *Bioprocess and Biosystems Engineering*, Vol. 35 No. 1–2, pp. 297–307.
- Lee, K.W., Kundu, J.K., Kim, S.O., Chun, K.-S., Lee, H.J. and Surh, Y.-J. (2006), "Cocoa polyphenols inhibit phorbol ester-induced superoxide anion formation in cultured HL-60 cells and expression of cyclooxygenase-2 and activation of NF-kappa B and MAPKs in mouse skin in vivo.", *The Journal of Nutrition*, Vol. 136 No. 5, pp. 1150–1155.
- Lee, S.J. and Wong, M. (2014), "Nano- and microencapsulations of food ingredients", *Nano-and Microencapsulation for Foods*, p. 48.
- Leo, E., Vandelli, M., Cameroni, R., Of, F.F.-I. journal and 1997, U. (1997), "Doxorubicin-loaded gelatin nanoparticles stabilized by glutaraldehyde Involvement of the drug in the cross-linking process", *International Journal of Pharmaceutics*, Vol. 155, pp. 75–82.
- Lima, Lí.J.R., Almeida, M.H., Rob Nout, M.J. and Zwietering, M.H. (2011), "Theobroma cacao L., 'the food of the gods': Quality determinants of commercial cocoa beans, with particular reference to the impact of fermentation", *Critical Reviews in Food Science and Nutrition*, Vol. 51 No. 8, pp. 731–761.
- Lin, J.K. and Weng, M.S. (2006), "Flavonoids as nutraceuticals", *The Science of Flavonoids*, Vol. 74 No. 4, pp. 213–238.
- Loksuwan, J. (2007), "Characteristics of microencapsulated β-carotene formed by spray drying with modified tapioca starch, native tapioca starch and



- maltodextrin”, *Food Hydrocolloids*, Vol. 21 No. 5–6, pp. 928–935.
- Lotito, S.B., Actis-Goretta, L., Renart, M.L., Caligiuri, M., Rein, D., Schmitz, H.H., Steinberg, F.M., et al. (2000), “Influence of oligomer chain length on the antioxidant activity of procyanidins”, *Biochemical and Biophysical Research Communications*, Vol. 276 No. 3, pp. 945–951.
- Lotito, S.B. and Frei, B. (2006), “Consumption of flavonoid-rich foods and increased plasma antioxidant capacity in humans: Cause, consequence, or epiphénomene?”, *Free Radical Biology and Medicine*, Vol. 41 No. 12, pp. 1727–1746.
- Lupo, B., Maestro, A., Gutiérrez, J.M. and González, C. (2015), “Characterization of alginate beads with encapsulated cocoa extract to prepare functional food: Comparison of two gelation mechanisms”, *Food Hydrocolloids*, Vol. 49, pp. 25–34.
- Lupo, B., Maestro, A., Porras, M., Gutiérrez, J.M. and González, C. (2014), “Preparation of alginate microspheres by emulsification/internal gelation to encapsulate cocoa polyphenols”, *Food Hydrocolloids*, Elsevier Ltd, Vol. 38, pp. 56–65.
- Macedo, A.S.L., Rocha, F. de S., Ribeiro, M. da S., Soares, S.E. and Bispo, E. da S. (2016), “Characterization of polyphenol oxidase in two cocoa (*Theobroma cacao L.*) cultivars produced in the south of Bahia, Brazil”, *Food Science and Technology*, Vol. 36 No. 1, pp. 56–63.
- Maeta, K., Nomura, W., Takatsume, Y., Izawa, S. and Inoue, Y. (2007), “Green tea polyphenols function as prooxidants to activate oxidative-stress-responsive transcription factors in yeasts”, *Applied and Environmental Microbiology*, Vol. 73 No. 2, pp. 572–580.
- Maji, T.K. and Hussain, M.R. (2007), “Microencapsulation of zanthoxylum limonella oil (ZLO) in genipin crosslinked chitosan-gelatin complex for mosquito repellent application”, *Bioresource Technology*, Vol. 98, pp. 840–844.
- Makkar, H.P.S., Dawra, R.K. and Singh, B. (1987), “Protein precipitation assay for quantitation of tannins: determination of protein in tannin-protein complex”, *Analytical Biochemistry*, Vol. 166, pp. 435–439.
- Martín, M.A. and Ramos, S. (2016), “Cocoa polyphenols in oxidative stress: Potential health implications”, *Journal of Functional Foods*, Elsevier Ltd, Vol. 27, pp. 570–588.
- Mateos, R., Lecumberri, E., Ramos, S., Goya, L. and Bravo, L. (2005), “Determination of malondialdehyde (MDA) by high-performance liquid chromatography in serum and liver as a biomarker for oxidative stress: Application to a rat model for hypercholesterolemia and evaluation of the effect of diets rich in phenolic antioxidant”, *Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences*, Vol. 827 No. 1, pp. 76–82.
- Mayer, A.M. (2006), “Polyphenol oxidases in plants and fungi: Going places? A review”, *Phytochemistry*, Vol. 67 No. 21, pp. 2318–2331.
- Maynard, C., Swenson, R., Paris, J.A., Martin, J.S., Hallstrom, A.P., Cerqueira, M.D. and Weaver, W.D. (1998), “Randomized, controlled trial of RheothRx



- (poloxamer 188) in patients with suspected acute myocardial infarction”, *American Heart Journal*, Vol. 135 No. 5 I, pp. 797–804.
- Mayorga-Gross, A.L., Quirós-Guerrero, L.M., Fourny, G. and Vaillant, F. (2016), “An untargeted metabolomic assessment of cocoa beans during fermentation”, *Food Research International*, Elsevier Ltd, Vol. 89, pp. 901–909.
- McDonald, S., Prenzler, P.D., Antolovich, M. and Robards, K. (2001), “Phenolic content and antioxidant activity of olive extracts”, *Food Chemistry*, Vol. 73 No. 1, pp. 73–84.
- Menon, A., Hii, C., Law, C., Suzannah, S. and Djaenali, M. (2015), “Effects of water blanching on total polyphenol contents of dried cocoa beans”, *The 8th Asia-Pacific Drying Conference (ADC)*, No. August, pp. 10–12.
- Miller, K.B., Hurst, W.J., Flannigan, N., Ou, B., Lee, C.Y., Smith, N. and Stuart, D.A. (2009), “Survey of Commercially Available Chocolate- and Cocoa-Containing Products in the United States . 2 . Comparison of Flavan-3-ol Content with Nonfat Cocoa Solids , Total Polyphenols , and Percent Cacao”, *Journal of Agricultural and Food Chemistry*, Vol. 57 No. 19, pp. 9169–9180.
- Mishra, P., Mishra, S. and Mahanta, C.L. (2014), “Effect of maltodextrin concentration and inlet temperature during spray drying on physicochemical and antioxidant properties of amla (*Emblica officinalis*) juice powder”, *Food and Bioproducts Processing*, Institution of Chemical Engineers, Vol. 92 No. 3, pp. 252–258.
- Misnawi. (2003), “Influences of cocoa polyphenols and enzyme reactivation on the flavor development of unfermented and under-fermented cocoa beans”, *Thesis, Universitas Putra Malaysia*, p. 329p.
- Mohanraj, V.J. and Chen, Y. (2006), “Nanoparticles—a review”, *Tropical Journal of Pharmaceutical Research*, Vol. 5 No. 1, pp. 561–573.
- Mohanty, B. and Bohidar, H.B. (2003), “Systematic of Alcohol-Induced Simple Coacervation in Aqueous Gelatin Solutions”, *Biomacromolecules*, Vol. 4, pp. 1080–1086.
- Mora-Huertas, C.E., Fessi, H. and Elaissari, A. (2010), “Polymer-based nanocapsules for drug delivery”, *International Journal of Pharmaceutics*, Vol. 385 No. 1–2, pp. 113–142.
- Morgan, K.T., Clarke, D.O., Beauchamp, R.O., St Clair, M.B.G., Fennell, T.R. and Karl, F.W. (1992), “A Critical Review of the Toxicology of Glutaraldehyde”, *Critical Reviews in Toxicology*, Vol. 22 No. 3–4, pp. 143–174.
- Mozafari, M.R., Flanagan, J., Matia-Merino, L., Awati, A., Omri, A., Suntres, Z.E. and Singh, H. (2006), “Recent trends in the lipid-based nanoencapsulation of antioxidants and their role in foods”, *Journal of the Science of Food and Agriculture*, Vol. 86, pp. 2038–2045.
- Muhammad, D.R.A., Saputro, A.D., Rottiers, H., Van de Walle, D. and Dewettinck, K. (2018), “Physicochemical properties and antioxidant activities of chocolates enriched with engineered cinnamon nanoparticles”, *European Food Research and Technology*, Springer Berlin Heidelberg, Vol. 244 No. 7, pp. 1185–1202.
- Mukherjee, S. and Chattopadhyay, P.K. (2007), “Whirling bed blanching of potato cubes and its effects on product quality”, *Journal of Food Engineering*, Vol.



- 78 No. 1, pp. 52–60.
- Naczk, M. and Shahidi, F. (2006), “Phenolics in cereals , fruits and vegetables : Occurrence , extraction and analysis”, *Journal of Pharmaceutical and Biomedical Analysis*, Vol. 41, pp. 1523–1542.
- Nahar, M., Mishra, D., Dubey, V. and Jain, N.K. (2008), “Development, characterization, and toxicity evaluation of amphotericin B-loaded gelatin nanoparticles”, *Nanomedicine: Nanotechnology, Biology, and Medicine*, Vol. 4 No. 3, pp. 252–261.
- Nakamura, M., Ra, J.H., Jee, Y. and Kim, J.S. (2017), “Impact of different partitioned solvents on chemical composition and bioavailability of *Sasa quelpaertensis* Nakai leaf extract”, *Journal of Food and Drug Analysis*, Elsevier Ltd, Vol. 25 No. 2, pp. 316–326.
- Nakao, M., Takio, S. and Ono, K. (1998), “Alkyl peroxy radical-scavenging activity of catechins”, *Phytochemistry*, Vol. 49 No. 8, pp. 2379–2382.
- Nijveldt, R.J., Nood, E. van, Hoorn, D.E. van, Boelens, P.G., Norren, K. van and Leeuwen, P.A. van. (2001), “Flavonoids : a review of probable mechanisms of action and”, *The American Journal of Clinical Nutrition*, Vol. 74, pp. 418–425.
- Ninan, G., Jose, J. and Abubacker, Z. (2011), “Preparation and characterization of gelatin extracted from the skins of rohu (*labeo rohita*) and common carp (*cyprinus carpio*”, *Journal of Food Processing and Preservation*, Vol. 35 No. 2, pp. 143–161.
- Noronha, C.M., Granada, A.F., de Carvalho, S.M., Lino, R.C., Matheus, M.V. and Barreto, P.L.M. (2013), “Optimization of α -tocopherol loaded nanocapsules by the nanoprecipitation method”, *Industrial Crops and Products*, Elsevier B.V., Vol. 50, pp. 896–903.
- Nourian, F., Ramaswamy, H.S. and Kushalappa, A.C. (2003), “Kinetics of quality change associated with potatoes stored at different temperatures”, *LWT - Food Science and Technology*, Vol. 36 No. 1, pp. 49–65.
- Nurhayati, Setyabudi, S.F., Marseno, D.W. and Supriyanto. (2017), “Inactivation of Polyphenol oxidase with Microwave and Its Influence on Total Polyphenol Content and Antioxidant Activity of Cocoa Beans (*Theobroma Cacao L.*)”, *The International Journal Of Science & Technoledge*, Vol. 5 No. 2, pp. 52–57.
- Ofokansi, K., Winter, G., Fricker, G. and Coester, C. (2010), “Matrix-loaded biodegradable gelatin nanoparticles as new approach to improve drug loading and delivery”, *European Journal of Pharmaceutics and Biopharmaceutics*, Elsevier B.V., Vol. 76 No. 1, pp. 1–9.
- Ojwang, L.O., Yang, L., Dykes, L. and Awika, J. (2013), “Proanthocyanidin profile of cowpea (*Vigna unguiculata*) reveals catechin-O-glucoside as the dominant compound”, *Food Chemistry*, Elsevier Ltd, Vol. 139 No. 1–4, pp. 35–43.
- Oracz, J. and Nebesny, E. (2016), “Antioxidant Properties of Cocoa Beans (*Theobroma cacao L.*): Influence of Cultivar and Roasting Conditions”, *International Journal of Food Properties*, Taylor & Francis, Vol. 19 No. 6, pp. 1242–1258.
- Oracz, J., Nebesny, E. and Żyżelewicz, D. (2015), “Changes in the flavan-3-ols,



- anthocyanins, and flavanols composition of cocoa beans of different *Theobroma cacao L.* groups affected by roasting conditions”, *European Food Research and Technology*, Vol. 241 No. 5, pp. 663–681.
- Ortega, N., Romero, M.P., MacIà, A., Reguant, J., Anglès, N., Morelló, J.R. and Motilva, M.J. (2008), “Obtention and characterization of phenolic extracts from different cocoa sources”, *Journal of Agricultural and Food Chemistry*, Vol. 56 No. 20, pp. 9621–9627.
- Ortiz-Basurto, R.I., Rubio-Ibarra, M.E., Ragazzo-Sánchez, J.A., Beristain, C.I. and Jiménez-Fernández, M. (2017), “Microencapsulation of *Eugenia uniflora L.* juice by spray drying using fructans with different degrees of polymerisation”, *Carbohydrate Polymers*, Elsevier Ltd., Vol. 175, pp. 603–609.
- Othman, A., Ismail, A., Abdul Ghani, N. and Adenan, I. (2007), “Antioxidant capacity and phenolic content of cocoa beans”, *Food Chemistry*, Vol. 100 No. 4, pp. 1523–1530.
- Ottaviani, J.I., Balz, M., Kimball, J., Ensunsa, J.L., Fong, R., Momma, T.Y., Kwik-uribe, C., et al. (2015), “Safety and efficacy of cocoa flavanol intake in healthy adults: a randomized, controlled, double-masked trial”, *American Journal of Clinical Nutrition*, Vol. 102, pp. 1425–1435.
- Owens, D.E. and Peppas, N.A. (2006), “Opsonization, biodistribution, and pharmacokinetics of polymeric nanoparticles”, *International Journal of Pharmaceutics*, Vol. 307 No. 1, pp. 93–102.
- Özkan, G. and Bilek, S.E. (2014), “Microencapsulation of natural food colourants”, *International Journal of Nutrition and Food Sciences*, Vol. 3 No. 3, pp. 145–156.
- Ozkan, G., Franco, P., De Marco, I., Xiao, J. and Capanoglu, E. (2019), “A review of microencapsulation methods for food antioxidants: Principles, advantages, drawbacks and applications”, *Food Chemistry*, Elsevier, Vol. 272 No. July 2018, pp. 494–506.
- Patel, H.R., Patel, R.P. and Patel, M.M. (2009), “Poloxamers: A pharmaceutical excipients with therapeutic behaviors”, *International Journal of PharmTech Research*, Vol. 1 No. 2, pp. 299–303.
- Patel, Z.S., Yamamoto, M., Ueda, H., Tabata, Y. and Mikos, A.G. (2008), “Biodegradable gelatin microparticles as delivery systems for the controlled release of bone morphogenetic protein-2”, *Acta Biomaterialia*, Vol. 4 No. 5, pp. 1126–1138.
- Patras, M.A., Milev, B.P., Vrancken, G. and Kuhnert, N. (2014), “Identification of novel cocoa flavonoids from raw fermented cocoa beans by HPLC-MSn”, *Food Research International*, Elsevier B.V., Vol. 63, pp. 353–359.
- Payne, M.J., Hurst, W.J., Miller, K.B., Rank, C. and Stuart, D.A. (2010), “Impact of fermentation, drying, roasting, and dutch processing on epicatechin and catechin content of cacao beans and cocoa ingredients”, *Journal of Agricultural and Food Chemistry*, Vol. 58 No. 19, pp. 10518–10527.
- Peláez, P., Bardón, I. and Camasca, P. (2016), “Methylxanthine and catechin content of fresh and fermented cocoa beans, dried cocoa beans, and cocoa liquor”, *Scientia Agropecuaria*, Vol. 7 No. 4, pp. 355–365.
- Pietta, P.G. (2000), “Flavonoids as antioxidants”, *Journal of Natural Products*, Vol.



- 63 No. 7, pp. 1035–1042.
- Pillai, D.S., Prabhasankar, P., Jena, B.S. and Anandharamakrishnan, C. (2012), “Microencapsulation of garcinia cowa fruit extract and effect of its use on pasta process and quality”, *International Journal of Food Properties*, Vol. 15 No. 3, pp. 590–604.
- Pimpaporn, P., Devahastin, S. and Chiewchan, N. (2007), “Effects of combined pretreatments on drying kinetics and quality of potato chips undergoing low-pressure superheated steam drying”, *Journal of Food Engineering*, Vol. 81 No. 2, pp. 318–329.
- Pollard, S.E., Kuhnle, G.G.C., Vauzour, D., Vafeiadou, K., Tzounis, X., Whiteman, M., Rice-Evans, C., et al. (2006), “The reaction of flavonoid metabolites with peroxy nitrite”, *Biochemical and Biophysical Research Communications*, Vol. 350 No. 4, pp. 960–968.
- Prajapati, V.D., Jani, G.K., Moradiya, N.G. and Randeria, N.P. (2013), “Pharmaceutical applications of various natural gums, mucilages and their modified forms”, *Carbohydrate Polymers*, Elsevier Ltd., Vol. 92 No. 2, pp. 1685–1699.
- Prior, R.L. and Cao, G. (2000), “Antioxidant phytochemicals in fruits and vegetables: Diet and health implications”, *HortScience*, Vol. 35 No. 4, pp. 588–592.
- Procházková, D., Boušová, I. and Wilhelmová, N. (2011), “Antioxidant and prooxidant properties of flavonoids”, *Fitoterapia*, Vol. 82 No. 4, pp. 513–523.
- Pujimulyani, D., Raharjo, S., Marsono, Y. and Santoso, U. (2012), “The effect of blanching on antioxidant activity and glycosides of white saffron (*Curcuma mangga Val.*)”, *International Food Research Journal*, Vol. 19 No. 2, pp. 617–621.
- Pujimulyani, W., Raharjo, S., Marsono, Y. and Santoso, U. (2010), “Aktivitas Antioksidan Dan Kadar Senyawa Fenolik Pada Kunir Putih”, *Agritech*, Vol. 30 No. 2, pp. 68–74.
- Pulicharla, R., Marques, C., Das, R.K., Rouissi, T. and Brar, S.K. (2016), “Encapsulation and release studies of strawberry polyphenols in biodegradable chitosan nanoformulation”, *International Journal of Biological Macromolecules*, Elsevier B.V., Vol. 88, pp. 171–178.
- Putra, G., Wartini and Anggreni, D. (2010), “Characterization of Polyphenol Oxidase Enzyme of Cocoa Beans (*Theobroma cacao Linn.*)”, *Agritech*, Vol. 30 No. 3, pp. 152–157.
- Putra Ganda, G.P., Wartini, N.M. and Anggreni, A.A.M. (2010), “Characterization of Polyphenol Oxidase Enzyme of Cocoa Beans (*Theobroma cacao Linn.*)”, *Agritech*, Vol. 30 No. 3, pp. 152–157.
- Puupponen-Pimiä, R., Häkkinen, S.T., Aarni, M., Suortti, T., Lampi, A.M., Eurola, M., Piironen, V., et al. (2003), “Blanching and long-term freezing affect various bioactive compounds of vegetables in different ways”, *Journal of the Science of Food and Agriculture*, Vol. 83 No. 14, pp. 1389–1402.
- Raharjo, S. (2006), *Kerusakan Oksidatif Pada Makanan*, Gadjah Mada University Press, Yogyakarta, available at: <http://ugmpress.ugm.ac.id/id/product/pertanian/kerusakan-oksidatif-pada->



makanan.

- Ramesh, M.N., Wolf, W., Tevini, D. and Jung, G. (2001), "Influence of processing parameters on the drying of spice paprika", *Journal of Food Engineering*, Vol. 49 No. 1, pp. 63–72.
- Ramiro-Puig, E., Pérez-Cano, F.J., Ramírez-Santana, C., Castellote, C., Izquierdo-Pulido, M., Permanyer, J., Franch, A., et al. (2007), "Spleen lymphocyte function modulated by a cocoa-enriched diet", *Clinical and Experimental Immunology*, Vol. 149 No. 3, pp. 535–542.
- Rao, J.P. and Geckeler, K.E. (2011), "Polymer nanoparticles: Preparation techniques and size-control parameters", *Progress in Polymer Science (Oxford)*, Elsevier Ltd, Vol. 36 No. 7, pp. 887–913.
- Rao, P.J. and Khanum, H. (2016), "A green chemistry approach for nanoencapsulation of bioactive compound - Curcumin", *LWT - Food Science and Technology*, Elsevier Ltd, Vol. 65, pp. 695–702.
- Rattes, A.L.R. and Oliveira, W.P. (2007), "Spray drying conditions and encapsulating composition effects on formation and properties of sodium diclofenac microparticles", *Powder Technology*, Vol. 171 No. 1, pp. 7–14.
- Rawson, A., Tiwari, B.K., Tuohy, M.G., O'Donnell, C.P. and Brunton, N. (2011), "Effect of ultrasound and blanching pretreatments on polyacetylene and carotenoid content of hot air and freeze dried carrot discs", *Ultrasonics Sonochemistry*, Elsevier B.V., Vol. 18 No. 5, pp. 1172–1179.
- Rezende, Y.R.R.S., Nogueira, J.P. and 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*, Elsevier, Vol. 254, pp. 281–291.
- Rice-Evans, C., Miller, N.J. and Paganga, G. (1997), "Antioxidant properties of phenolic", *Trends in Plant Science*, Vol. 2 No. 4, pp. 152–159.
- Rice-Evans, C.A., Miller, N.J. and Paganga, G. (1996), "Structure-antioxidant activity relationships of flavonoids and phenolic acids", *Free Radical Biology and Medicine*, Vol. 20 No. 7, pp. 933–956.
- Rimbach, G., Melchin, M., Moehring, J. and Wagner, A.E. (2009), "Polyphenols from cocoa and vascular health - A critical review", *International Journal of Molecular Sciences*, Vol. 10 No. 10, pp. 4290–4309.
- Rodríguez, J., Martín, M.J., Ruiz, M.A. and Clares, B. (2016), "Current encapsulation strategies for bioactive oils: From alimentary to pharmaceutical perspectives", *Food Research International*, Elsevier Ltd, Vol. 83, pp. 41–59.
- Rose, J.B., Pacelli, S., El Haj, A.J., Dua, H.S., Hopkinson, A., White, L.J. and Rose, F.R.A.J. (2014), "Gelatin-based materials in ocular tissue engineering", *Materials*, Vol. 7 No. 4, pp. 3106–3135.
- Şahin-Nadeem, H., Dinçer, C., Torun, M., Topuz, A. and özdemir, F. (2013), "Influence of inlet air temperature and carrier material on the production of instant soluble sage (*Salvia fruticosa* Miller) by spray drying", *LWT - Food Science and Technology*, Vol. 52 No. 1, pp. 31–38.
- Sahoo, N., Sahoo, R.K., Biswas, N., Guha, A. and Kuotsu, K. (2015), "Recent advancement of gelatin nanoparticles in drug and vaccine delivery",



- International Journal of Biological Macromolecules*, Elsevier B.V., Vol. 81, pp. 317–331.
- Saloko, S., Darmadji, P., Setiaji, B., Pranoto, Y. and Anal, A.K. (2013), “Encapsulation of coconut shell liquid smoke in chitosan-maltodextrin based nanoparticles”, *International Food Research Journal*, Vol. 20 No. 3, pp. 1269–1276.
- Santiago, D., Paese, K., Stanisquaski, S., Jablonski, A., Hickmann, S. and Oliveira, A. De. (2018), “Industrial Crops & Products Encapsulation efficiency and thermal stability of norbixin microencapsulated by spray-drying using different combinations of wall materials”, *Industrial Crops & Products*, Vol. 111 No. July 2017, pp. 846–855.
- Saxena, A., Sachin, K., Bohidar, H.B. and Verma, A.K. (2005), “Effect of molecular weight heterogeneity on drug encapsulation efficiency of gelatin nano-particles”, *Colloids and Surfaces B: Biointerfaces*, Vol. 45 No. 1, pp. 42–48.
- Scapagnini, G., Davinelli, S., Di Renzo, L., De Lorenzo, A., Olarte, H.H., Micali, G., Cicero, A.F., et al. (2014), “Cocoa bioactive compounds: Significance and potential for the maintenance of skin health”, *Nutrients*, Vol. 6 No. 8, pp. 3202–3213.
- Schafroth, N., Arpagaus, C., Jadhav, U.Y., Makne, S. and Douroumis, D. (2012), “Nano and microparticle engineering of water insoluble drugs using a novel spray-drying process”, *Colloids and Surfaces B: Biointerfaces*, Elsevier B.V., Vol. 90 No. 1, pp. 8–15.
- Schoubben, A., Blasi, P., Giovagnoli, S., Rossi, C. and Ricci, M. (2010), “Development of a scalable procedure for fine calcium alginate particle preparation”, *Chemical Engineering Journal*, Vol. 160 No. 1, pp. 363–369.
- Serra Bonvehí, J. and Ventura Coll, F. (1997), “Evaluation of bitterness and astringency of polyphenolic compounds in cocoa powder”, *Food Chemistry*, Vol. 60 No. 3, pp. 365–370.
- Shahidi, F. and Naczk, M. (2004), *Phenolics in Food and Nutraceuticals, Phenolics in Food and Nutraceuticals*, Vol. 14, CRC Press Inc, Boca Raton London New York Washington, D.C., available at:<https://doi.org/10.1017/CBO9781107415324.004>.
- Shishir, M.R.I., Xie, L., Sun, C., Zheng, X. and Chen, W. (2018), “Advances in micro and nano-encapsulation of bioactive compounds using biopolymer and lipid-based transporters”, *Trends in Food Science and Technology*, Elsevier, Vol. 78 No. May, pp. 34–60.
- Siegbahn, P.E.M. (2004), “The catalytic cycle of catechol oxidase”, *Journal of Biological Inorganic Chemistry*, Vol. 9 No. 5, pp. 577–590.
- Singh, D.K. and Mahapatro, A. (2011), “Biodegradable nanoparticles are excellent vehicle for site directed in-vivo delivery of drugs and vaccines”, *Journal of Nanobiotechnology*, Vol. 9 No. 1, p. 55.
- de Souza Simões, L., Madalena, D.A., Pinheiro, A.C., Teixeira, J.A., Vicente, A.A. and Ramos, Ó.L. (2017), “Micro- and nano bio-based delivery systems for food applications: In vitro behavior”, *Advances in Colloid and Interface Science*, Vol. 243, pp. 23–45.



- Souza, V.B. De, Fujita, A., Thomazini, M., Da Silva, E.R., Lucon, J.F., Genovese, M.I. and Favaro-Trindade, C.S. (2014), "Functional properties and stability of spray-dried pigments from Bordo grape (*Vitis labrusca*) winemaking pomace", *Food Chemistry*, Elsevier Ltd, Vol. 164, pp. 380–386.
- de Souza, V.B., Thomazini, M., Echalar Barrientos, M.A., Nalin, C.M., Ferro-Furtado, R., Genovese, M.I. and Favaro-Trindade, C.S. (2018), "Functional properties and encapsulation of a proanthocyanidin-rich cinnamon extract (*Cinnamomum zeylanicum*) by complex coacervation using gelatin and different polysaccharides", *Food Hydrocolloids*, Vol. 77, pp. 297–306.
- Stalikas, C.D. (2007), "Extraction, separation, and detection methods for phenolic acids and flavonoids", *Journal of Separation Science*, Vol. 30 No. 18, pp. 3268–3295.
- Stuckey, B. (1972), *Antioxidants as Food Stabilizers*, in: *Handbook of Food Additives*, edited by Furia, T..*Handbook of Food Additives*, Vol I., CRC Press Inc, Florida.
- Suazo, Y., Davidov-Pardo, G. and Arozarena, I. (2014), "Effect of Fermentation and Roasting on the Phenolic Concentration and Antioxidant Activity of Cocoa from Nicaragua", *Journal of Food Quality*, Vol. 37 No. 1, pp. 50–56.
- Sugiyanti, D., Darmadji, P., Anggrahini, S., Anwar, C. and Santoso, U. (2018), "Preparation and Characterization of Chitosan from Indonesian Tambak Lorok Shrimp Shell Waste and Crab Shell Waste", *Pakistan Journal of Nutrition*, Vol. 17 No. 9, pp. 446–453.
- Supriyanto, Haryadi, Raharjo, B. and Marseno, D.W. (2006), "Aktivitas antioksidan ekstrak polifenol kasar dari kakao hasil penyaringan menggunakan energi gelombang mikro", *Jurnal Teknologi Dan Industri Pangan*, Vol. XVII No. 3, pp. 176–182.
- Taifi, M. (2016), "Cocoa extracts encapsulation for avoiding polyphenols degradation", *Report*, Barcelona, No. January, pp. 1–37.
- Tamaroh, S., Raharjo, S., Murdiati, A. and Anggrahini, S. (2018), "Total Phenolic Content and Antioxidant Activity of Anthocyanin Extract from Purple Yam (*Dioscorea alata L.*) Flour Using Different Solvents", *Pakistan Journal of Nutrition*, Vol. 16 No. 6, pp. 260–267.
- Tan, C., Xie, J., Zhang, X., Cai, J. and Xia, S. (2016), "Polysaccharide-based nanoparticles by chitosan and gum arabic polyelectrolyte complexation as carriers for curcumin", *Food Hydrocolloids*, Elsevier Ltd, Vol. 57, pp. 236–245.
- Tang, D.W., Yu, S.H., Ho, Y.C., Huang, B.Q., Tsai, G.J., Hsieh, H.Y., Sung, H.W., et al. (2013), "Characterization of tea catechins-loaded nanoparticles prepared from chitosan and an edible polypeptide", *Food Hydrocolloids*, Elsevier Ltd, Vol. 30 No. 1, pp. 33–41.
- Tang, S.Z., Kerry, J.P., Sheehan, D. and Buckley, D.J. (2002), "Antioxidative mechanisms of tea catechins in chicken meat systems", *Food Chemistry*, Vol. 76 No. 1, pp. 45–51.
- Taruna Syah, I., Darmadji, P. and Pranoto, Y. (2016), "Microencapsulation of Refined Liquid Smoke Using Maltodextrin Produced from Broken Rice Starch", *Journal of Food Processing and Preservation*, Vol. 40 No. 3, pp.



437–446.

- Tiwari, B.K., Muthukumarappan, K., O'Donnell, C.P. and Cullen, P.J. (2008), "Effects of sonication on the kinetics of orange juice quality parameters", *Journal of Agricultural and Food Chemistry*, Vol. 56 No. 7, pp. 2423–2428.
- Tolun, A., Altintas, Z. and Artik, N. (2016), "Microencapsulation of grape polyphenols using maltodextrin and gum arabic as two alternative coating materials: Development and characterization", *Journal of Biotechnology*, Elsevier B.V., Vol. 239, pp. 23–33.
- Tomas-Barberán, F.A., Cienfuegos-Jovellanos, E., Marín, A., Muguerza, B., Gil-Izquierdo, A., Cerdá, B., Zafrilla, P., et al. (2007), "A new process to develop a cocoa powder with higher flavonoid monomer content and enhanced bioavailability in healthy humans", *Journal of Agricultural and Food Chemistry*, Vol. 55 No. 10, pp. 3926–3935.
- Tonon, R. V., Brabet, C. and Hubinger, M.D. (2010), "Anthocyanin stability and antioxidant activity of spray-dried açai (*Euterpe oleracea* Mart.) juice produced with different carrier agents", *Food Research International*, Elsevier Ltd, Vol. 43 No. 3, pp. 907–914.
- Tonon, R. V., Brabet, C., Pallet, D., Brat, P. and Hubinger, M.D. (2009), "Physicochemical and morphological characterisation of açai (*Euterpe oleracea* Mart.) powder produced with different carrier agents", *International Journal of Food Science and Technology*, Vol. 44 No. 10, pp. 1950–1958.
- Tran, T.T.. and Nguyen, H.V.H. (2018), "Effects of Spray-Drying Temperatures and Carriers on Physical and Antioxidant Properties of Lemongrass Leaf Extract Powder", *Beverages*, Vol. 4 No. 4, p. 84.
- Tribst, A.A.L., Leite Júnior, B.R.D.C., De Oliveira, M.M. and Cristianini, M. (2016), "High pressure processing of cocoyam, Peruvian carrot and sweet potato: Effect on oxidative enzymes and impact in the tuber color", *Innovative Food Science and Emerging Technologies*, Elsevier Ltd, Vol. 34, pp. 302–309.
- Trognitz, B., Cros, E., Assemat, S., Davrieux, F., Forestier-Chiron, N., Ayestas, E., Kuant, A., et al. (2013), "Diversity of Cacao Trees in Waslala, Nicaragua: Associations between Genotype Spectra, Product Quality and Yield Potential", *PLoS ONE*, Vol. 8 No. 1, available at:<https://doi.org/10.1371/journal.pone.0054079>.
- Turkmen, N., Sari, F. and Velioglu, Y.S. (2005), "The effect of cooking methods on total phenolics and antioxidant activity of selected green vegetables", *Food Chemistry*, Vol. 93 No. 4, pp. 713–718.
- Utami, R.R., Armunanto, R., Rahardjo, S. and Supriyanto. (2016), "Effects of cocoa bean (*Theobroma cacao* L.) fermentation on phenolic content, antioxidant activity and functional group of cocoa bean shell", *Pakistan Journal of Nutrition*, Science Alert, Vol. 15 No. 10, pp. 948–953.
- Volden, J., Borge, G.I.A., Bengtsson, G.B., Hansen, M., Thygesen, I.E. and Wicklund, T. (2008), "Effect of thermal treatment on glucosinolates and antioxidant-related parameters in red cabbage (*Brassica oleracea* L. ssp. *capitata* f. *rubra*)", *Food Chemistry*, Vol. 109 No. 3, pp. 595–605.
- Weber, C., Coester, C., Kreuter, J. and Langer, K. (2000), "Desolvation process and surface characterisation of protein nanoparticles", *International Journal of*



- Pharmaceutics*, Vol. 194, pp. 91–102.
- Wen, T.N., Prasad, K.N., Yang, B. and Ismail, A. (2010), “Bioactive substance contents and antioxidant capacity of raw and blanched vegetables”, *Innovative Food Science and Emerging Technologies*, Elsevier Ltd, Vol. 11 No. 3, pp. 464–469.
- Wollgast, J. and Anklam, E. (2000), “Review on polyphenols in *Theobroma cacao*: Changes in composition during the manufacture of chocolate and methodology for identification and quantification”, *Food Research International*, Vol. 33 No. 6, pp. 423–447.
- Won, Y.W. and Kim, Y.H. (2009), “Preparation and cytotoxicity comparison of type a gelatin nanoparticles with recombinant human gelatin nanoparticles”, *Macromolecular Research*, Vol. 17 No. 7, pp. 464–468.
- Xiao, H.W., Bai, J.W., Xie, L., Sun, D.W. and Gao, Z.J. (2015), “Thin-layer air impingement drying enhances drying rate of American ginseng (*Panax quinquefolium* L.) slices with quality attributes considered”, *Food and Bioproducts Processing*, Institution of Chemical Engineers, Vol. 94 No. August, pp. 581–591.
- Xiao, H.W., Pan, Z., Deng, L.Z., El-Mashad, H.M., Yang, X.H., Mujumdar, A.S., Gao, Z.J., et al. (2017), “Recent developments and trends in thermal blanching – A comprehensive review”, *Information Processing in Agriculture*, China Agricultural University, Vol. 4 No. 2, pp. 101–127.
- Xiao, H.W., Yao, X.D., Lin, H., Yang, W.X., Meng, J.S. and Gao, Z.J. (2012), “Effect of SSB (Superheated Steam Blanching) time and drying temperature on hot air impingement drying kinetics and quality attributes of yam slices”, *Journal of Food Process Engineering*, Vol. 35 No. 3, pp. 370–390.
- Xu, B. and Chang, S.K.C. (2008), “Effect of soaking, boiling, and steaming on total phenolic contentand antioxidant activities of cool season food legumes”, *Food Chemistry*, Vol. 110 No. 1, pp. 1–13.
- Xu, G., Ye, X., Chen, J. and Liu, D. (2007), “Effect of Heat Treatment on the Phenolic Compounds and Antioxidant Capacity of Citrus Peel Extract”, *Journal of Agricultural and Food Chemistry*, Vol. 55, pp. 330–335.
- Xu, Z., Wei, L. hong, Ge, Z. zhen, Zhu, W. and Li, C. mei. (2015), “Comparison of the degradation kinetics of A-type and B-type proanthocyanidins dimers as a function of pH and temperature”, *European Food Research and Technology*, Vol. 240 No. 4, pp. 707–717.
- Yang, H., Feng, K., Wen, P., Zong, M.H., Lou, W.Y. and Wu, H. (2017), “Enhancing oxidative stability of encapsulated fish oil by incorporation of ferulic acid into electrosprayed zein mat”, *LWT - Food Science and Technology*, Elsevier Ltd, Vol. 84, pp. 82–90.
- Yeh, C.-T. and Yen, G.-C. (2006), “Induction of hepatic antioxidant enzymes by phenolic acids in rats is accompanied by increased levels of multidrug resistance-associated protein 3 mRNA expression.”, *The Journal of Nutrition*, Vol. 136 No. 1, pp. 11–15.
- Yeh, S.L., Wang, W.Y., Huang, C.H. and Hu, M.L. (2005), “Pro-oxidative effect of β-carotene and the interaction with flavonoids on UVA-induced DNA strand breaks in mouse fibroblast C3H10T1/2 cells”, *Journal of Nutritional*



Biochemistry, Vol. 16 No. 12, pp. 729–735.

- Yilmaz, Y. and Toledo, R.T. (2004), “Major Flavonoids in Grape Seeds and Skins: Antioxidant Capacity of Catechin, Epicatechin, and Gallic Acid”, *Journal of Agricultural and Food Chemistry*, Vol. 52 No. 2, pp. 255–260.
- Yu, C., Ma, J. and Wang, W. (2010), “Preparation of redispersible emulsion powder by spray drying”, *International Journal of Food Engineering*, Vol. 6 No. 2, available at:<https://doi.org/10.2202/1556-3758.1840>.
- Zauner, W., Farrow, N.A. and Haines, A.M.R. (2001), “In vitro uptake of polystyrene microspheres: Effect of particle size, cell line and cell density”, *Journal of Controlled Release*, Vol. 71 No. 1, pp. 39–51.
- Zhao, B., Xie, J. and Zhao, J. (2004), “A novel water-soluble nanoparticles of hypocrellin B and their interaction with a model protein: C-phytocyanin”, *Biochimica et Biophysica Acta - General Subjects*, Vol. 1670 No. 2, pp. 113–120.