

BAB V KESIMPULAN DAN SARAN

5.1. Kesimpulan

1. Perbedaan konsentrasi CaCO_3 berpengaruh terhadap kadar air, laju rehidrasi, daya serap air, aktivitas air (a_w), tekstur, warna, dan juga organoleptik, Pengujian total antosianin, aktivitas antioksidan, dan kadar pati resisten.
2. Penambahan CaCO_3 hingga sebesar 0,20% memberikan peningkatan laju rehidrasi, daya serap air, dan *crispness* sedangkan peningkatan penambahan konsentrasi CaCO_3 melebihi 0,20% memberikan penurunan kadar air, a_w , dan *hardness*.
3. Pengujian total antosianin sebesar 2.7922mg/100mL, pengujian aktivitas antioksidan sebesar 87,46%, dan pengujian kadar pati resisten sebesar 19,75%.
4. Perlakuan terbaik menurut hasil organoleptik yaitu penambahan konsentrasi CaCO_3 sebesar 0,60%, dengan nilai perhitungan *spider web* luas segitiga sebesar 60,5151.

5.2. Saran

Sebaiknya dilakukan reformulasi dari sereal sarapan yaitu dengan meningkatkan penambahan gula pasir, hal ini ditunjukkan untuk meningkatkan rasa manis dari sereal sarapan agar lebih diminati oleh konsumen dan dimungkinkan gula mampu mempengaruhi terhadap pengujian yang dilakukan.

DAFTAR PUSTAKA

- Abia, R., Buchanan, C. J., Saura-Calixto, F., dan Eastwood, M. A. 1993. Structural Changes During The Retrogradation Of Legume Starches Modify The In Vitro Fermentation. *J. Agric. Food Chem.*, 41, 1856-1863.
- Andriani, B. M. 2012. *Pengaraman dan Pengeringan*. Jakarta: Departemen Pendidikan.
- Anggara, T. A. Triyono dan Hendra T. 2010. *Pengaruh Maltodekstrin dan Substitusi Tepung Pisang (Musa paradisiaca) Terhadap Karakteristik Flakes*. Subang: LIPI.
- Antara, N. S. dan Wartini, M. 2012. Senyawa Aroma dan Cita Rasa (Aroma and Flavour Compounds). *Tropical Plants and Curriculum Project*. Udayana University
- Apriyantono, A., D. Fardiaz., N. L. Puspitasari., Sedarnawati dan S. Budiyo. 1989. *Analisis Pangan*. Bogor: Institut Pertanian Bogor.
- Astawan, M. 2001. *Membuat Mi dan Bihun*. Jakarta: Penebar Swadaya.
- Bor S. L. 1991. *Rice Production Second Edition*. New York: Springer Science+Business Media New York.
- Brownmiller, C., Howard, L. R., & Prior, R. L. 2008. Processing and Storage Effects on Monomeric Anthocyanins, Percent Polymeric Colour, and Antioxidant Capacity of Processed Blueberry Products. *J. Food Sci.*, 5(73), 72-79.
- Bryant, C. M. and B. R. Hamaker. 1997. Effect of Lime on Gelatinization of Corn Flour and Starch. *Cereal Chem.* 74(2):171-175.
- Buckle, K. A., Edwards, R. A., Fleet, G. H. dan M. Wooton. 1987. *Ilmu Pangan*. Jakarta: UI-Press.
- Cadenas, E. and L. Packer, (Ed.). 2002. *Handbook of Antioxidants*. New York: Marcel Dekker, Inc., 1-2.

- Cahyono, B. 2009. *Pisang*. Yogyakarta: Penerbit Kanisius.
- Caterine, Yusi, S. S., Tomi, E. 2008. Raksi Mailard pada Produk Pangan. *PKM Penulisan Ilmiah*, Institut Pertanian Bogor, Bogor.
- Chittapalo, T. and P. Songsanandr. 2014. Product Development of Black Glutinous Rice Cracker with Panang Flavor and Its Quality Changes. *International Food Research Journal*. 21(5): 2025-2029 (2014).
- da Silva, E. P., H. H. Siqueira, C. Damiani, and E. V. de Barros Vilas Boas. 2016. Effect of Adding Flours from Marolo Fruit (*Annona Crassiflora Mart*) and Jerivá Fruit (*Syagrus Romanzoffiana Cham Glassm*) on the Physicals and Sensory Characteristics of Food Bars. *Food Sci. Technol, Campinas*, ISSN 0101-2061.
- deMan, J. 1999. *Principles of Food Chemistry 3rd Edition*. Maryland: Aspen Publisher, Inc.
- Dewi, M. S. H. 2012. Karakteristik Flake Beras Ketan Hitam dengan Perlakuan Suhu Perebusan dan Suhu Pengeringan. *Skripsi S-1*, Fakultas Teknologi Pertanian Universitas Katolik Widya Mandala Surabaya, Surabaya.
- Dharma, H. S. 2012. Peranan Antioksidan Endogen dan Eksogen terhadap Kesehatan. *Cermin Dunia Kedokteran*-198 39 (10): 793-794.
- Emaga, T. H., Christelle, R., Sebastien, N. R., Bernard, W., dan Michel, P. 2007. Dietary fibre components and pectin chemical features of peels during ripening in banana and plantain varieties. *J. Bio. Tech*. Vol. 99 4346-4354.
- Forsyth, W. G. C. 1980. *Banana and Plantain*. In: *Tropical and Subtropical Fruits*. S. Nagy and P. E. Shaw, pp. 258-78. Connecticut: AVI Publishing.
- Goffi, L., Garcia, D., Mafias, E., dan F. Saura, C. 1996. Analysis of Resistant Starch: A Method for Foods and Food Product. *J. Food Chem*. Vol. 56. No. 5 445-449.
- Gross. J. 1976. Carotenoids of Banana Pulp, Peel, and Leaves. *Lebensm Wiss, Technol*. 9 (211-214).

- Hamid, A. A., Aiyelaagbe, O. O., Usman, L. A., Ameen, O. M., and Lawal, A. 2010. Antioxidants: Its medicinal and pharmacological applications. *African J.Pure and Applied Chem.* Vol. 4 (8):142-151.
- Hariharn, M., N. Varghese, A. B. Cherian, P. V. Sreenivasan, J. Paul. 2014. Synthesis and Characterisation of CaCO₃ (Calsite) Nano Particles from Cockle Shells Using Chitosan as Precursors. *IJSRES* 4: 1-5.
- Haryo, R. B., Betty, S. L., Didah, N. F., dan Iwan S. 2015. Kajian Penentuan Pati Resisten yang Terkandung dalam Bahan Pangan seabgai Sumber Prebiotik. *Jurnal ilmu Pertanian Indonesia.* Vol. 20 (3): 191-200.
- Herawati, H. 2008. Penentuan Umur Simpan pada Produk Pangan, *Jurnal Litbang Pertanian* 27(4) http://tekpan.unimus.ac.id/wp-content/uploads/2013/11/p3274082_penentuan_umur_simpan-libre.pdf (diakses pada 3 Mei 2017).
- Herliana, S. 2006. Pengaruh Jumlah Air dan Lama Pengukusan terhadap Beberapa Karakteristik *Flakes* Ubi Kayu (*Manihot esculenta Crantz*). *Skripsi S-1*. Fakultas Teknologi Industri Pertanian, Universitas Padjajaran, Sumedang.
- Hiemori, M., E. Koh, and A. E. Mitchell. 2009. Influence of Cooking on Anthocyanins in Black Rice (*Oryza sativa* L. japonica var. SBR). *J. Agric. Food Chem.* 57:1908–1914.
- Hou Z., Qin P. and Ren G. (2010). Effect of Anthocyanin-Rich Extract from Black Rice (*Oryza sativa* L. Japonica) on Chronically Alcohol - Induced Liver Damage in Rats. *J Agri Food Chem* 58:3191–3196.
- Hutchings, J. B. 1999. *Food Colour and Appearance 2nd edition*. Gaithersburg: Springer.
- IBa. 2016. *Super Dolomite & Calcium Carbonate Manufacturing*, <http://www.iba.co.id/produk/calcium-carbonate/> (diakses pada 5 Mei 2016).

- ISO. 2009. *Cereals and Cereal Products* — Determination of Moisture Content. <https://www.iso.org/obp/ui/#iso:std:iso:712:ed-4:v1:en> (3 Mei 2017).
- Kartika, B., P. Hastuti., dan W. Supartono. 1988. *Pedoman Uji Inderawi Bahan Pangan*. Yogyakarta: Universitas Gadjah Mada.
- Kirca, A., Ozkan, M., & Cemeroglu, B. (2003). Thermal Stability of Black Carrot Anthocyanins in Blond Orange Juice. *J. Food Quality*, Vol. 26. No. 5 361-366.
- Kumari, M., Urooj, A. Dan Prasad, N. N. 2007. Effect Of Storage On Resistant Starch And Amylose Content Of Cereal-Pulse Base Ready-To-Eat Commercial Product. *J. Food chem.* 102: 1425-1430.
- Lawless, H. T. and H. Heymann. 2010. *Sensory Evaluation of Food Principles and Practices Second Edition*. New York: Springer.
- Machado, M.D.F., Oliveira, F.A.R., Gekas, V. & Singh, P. 1998. Modelling Water Uptake And Solid Loss By Puffed Breakfast Cereal Immersed In Water. *International J. Food Sci. and Tech.* Vol. 33, 225–237.
- Maiti, R., P. Satya., D. Rajkumar and A. Ramaswamy. 2012. *Crop Plant Anatomy*. Oxfordshire: CABI, 44-45.
- Mangini, J. Nelly M., dan Shirley E. S. 2012. Gambaran Kandungan Zat Gizi Pada Beras Hitam (*Oryza Sativa L.*) Kultivar Pare Ambo Sulawesi Selatan, *Skripsi S-1*, Fakultas Kedokteran Universitas Sam Ratulangi, Manado.
- Markakis, P., 1982. *Anthocyanins as Food Colors*. New York: Academic Press, Inc., 1-2.
- Marsono, Y. 1997. Pengaruh Pengolahan Terhadap Pati Resisten Pisang Kepok (*Musa paradisiaca fa. typica*) dan Pisang Tanduk (*Musa paradisiaca fa. corniculata*). *J. Agritech* Vol. 22. No. 2 56-59.
- Matz, S. A. 1970. *Cereal Technology*. Westport Connecticut: The AVI Publishing Co.
- McCarthy. 1963. *Coopers Nutrition 5n Health and Disease*. J.B. Philadelphia: Lippincott Co.

- Merck. 2008. *Chemicals & Reagents*. Darmstadt: Merck KGaA.
- Mudjajanto, E. S dan L. N. Yulianti. 2004. *Membuat Aneka Roti*. Jakarta: Penerbit Swadaya.
- Murtadha, P. 2012. *Teknologi Pesca Panen dan Teknik Pengolahan Buah Pisang*. Jakarta: Balai Besar Penelitian dan Pengembangan Pasca Panen Pertanian.
- Nakornriab, M., T. Sriseadka and S. Wongpornchai. 2008. Quantification of Carotenoid and Flavonoid Components in Brans of Some Thai Black Rice Cultivars Using Supercritical Fluid Extraction and High-Performance Liquid Chromatography-Mass Spectrometry. *J. Food Lipid* 15:488–503.
- Narwidina, P. 2009. Pengembangan Minuman Isotonik Antosianin Beras Hitam (*Oryza sativa* L. *indica*) dan Efeknya Terhadap Kebugaran dan Aktivitas Antioksidan pada Manusia Pasca Stres Fisik: A Case Control Study. *Tesis*. Program Pascasarjana Fakultas Teknologi Pertanian. Universitas Gadjah Mada.
- Nurfiliyah, S. A. dan S. B. Widjanarko. 2014. Uji Efektifitas Pelepasan Retronasal Aroma Jeli Pisang Ambon Putih terhadap Persepsi Kenyang Panelis Overweight dan Obesitas. *Jurnal Pangan Dan Agroindustri* Vol.2 No.2 P.9-15, April 2014.
- Otsuka, M., Hatsue, M., Hiroyasu, F., Syuichi, K., dan Miki, I. 2001. Effect of Calcium Carboante and Calcium Htdoxide on Gelatinitation and Retrogradation of Corn Starch. *J. Nippon Shokuhin Kogaku Kaishi*. Vol. 48 No. 10 751-758.
- Park, Y. S., S. J. Kim and H. I. Chang. 2008. Isolation of Anthocyanin from Black Rice (Heuginjubyeo) and Screening of its Antioxidant Activities. *Korean Journal of Microbiology and Biotechnology*, Vol. 36, No. 1, 55–60 (2008).
- Patras, A., Nigel, P. B., Colm, O., dan B. K. Tiwari. 2010. Effect of Thermal Processing on Anthocyanon Stability in Foods; Mechanisms and Kinetics of Degradation. *J. Food Sci and Tech*. Vol. 21 3-11.

- Poland, G. L., Manion, J. T., Brenner, M. W. dan Harris, P. L. 1938. Sugar Changes in The Banan During Ripening. *J. Ind. And Eng. Chem.* Vol. 90 340-342.
- Prasawang, J. and N. Trachoo. 2010. Survival of Probiotic and Antioxidant Activity on Health Beverage from Fermented Purple Rice Supplemented with Probiotic. *2010 International Conference on Biology, Environment and Chemistry IPCBEE Vol.1* (2011) © (2011) IACSIT Press, Singapore, 169-172.
- Preedy, V. R. 2009. *Beer in Health and Disease Prevention*. London: Academic Press.
- Rahadja, A. 2015. Pengaruh Proporsi Sirup Glukosa Dan Gula Semut Terhadap Sifat Fisikokimia Dan Organoleptik Bipang Beras Hitam. Skripsi S-1, Fakultas Teknologi Pertanian, Universitas Katolik Widya Mandala, Surabaya.
- Rahayu D. S., D. Kusriani dan E. Fachriyah. 2009. Penentuan Aktivitas Antioksidan dari Ekstrak Etanol Daun Ketapang (*Terminalia catappa L.*) dengan Metode 1,1-difenil-2-pikrihidrazil (DPPH). http://eprints.undip.ac.id/2828/1/JURNAL_DWI_DRI_RAHAYU.pdf (20 September 2016).
- Rein, M. 2005. *Copigmentation Reactions and Color Stability of Berry Anthocyanins*. Helsinki: University of Helsinki. pp. 10-14.
- Riana D. 2012. Studi Pembuatan Bolu Kukus Tepung Pisang Raja (*Musa paradisiaca L.*), Skripsi S-1, Fakultas Pertanian Universitas Hasanudding, Makassar.
- Risnojatningsih, S. 2009. Pemanfaatan Limbah Padat Pupuk Za sebagai Bahan Baku Pembuatan Kalsium Karbonat (CaCO₃). *Jurnal Penelitian Ilmu-Ilmu Teknik*, 9 (1). Pp 38-47. ISSN 1411-9102.
- Rockland, L. B., dan Nishi S. K. 1980. Water Activity. *J. Food Tech.* Vol. 34 42-59.
- Safefood 360° inc. 2014. Water Activity (a_w) in Foods.

- Salminen, S. O., and R. E. Young. 1975. The Control Properties of Phosphofructokinase In Relation to The Respiratory Climacteric in Banana Fruit. *Plant Physiol.* 55, 45-50.
- Saltmarsh, M (Ed.). 2013. *Essential Guide to Food Additives*. Cambridge: The Royal Society of Chemistry.
- Sauvageot, F. dan Geneciete, B. 1990. Effect of Water Activity on Crispness of Breakfast Cereals. *J. Texture Studies*. Vol. 22 423-442.
- Schroeder, L. J., Michael, J., dan Arthur, H. S. 1954. The Influence of Water and pH on the Reaction Between Amino Compounds and Carbohydrates. *J. Nutr.* Vol. 50 973-983.
- Sompong, R., S. Siebenhand l-Ehn, G. Linsberger-Martin and E. Berghofer. 2011. Physicochemical and Antioxidative Properties of Red and Black Rice Varieties From Thailand, China and Sri Lanka. *Food Chemistry*, 124(1): 132-140.
- Sopade, P. A and J. A. Obekpa. 1990. Modelling Water Absorption in Soybean, Cowpea and Peanuts at Three Temperatures Using Peleg's Equation. *Journal of Food Science* volume 55 (44).
- Standardisasi Nasional Indonesia. 1992. *Handbook SNI Karakteristik Flakes*. Jakarta: BSN Press.
- Sulusi, P. 2008. *Teknologi Pesca Panen dan Teknik Pengolahan Buah Pisang*. Jakarta: Balai Besar Penelitian dan Pengembangan Pasca Panen Pertanian.
- Supriadi, A. A. dan S. D. Lestari. 2013. Pengaruh Penambahan Tinta Cumi-Cumi (*Loligo sp*) Terhadap Kualitas Nutrisi dan Penerimaan Sensoris Mi Basah. *Fishtech*. 2(01): 22-37.
- Sutrisno. 2009. *Pengantar Teknologi Pangan*. Jakarta: Penerbit PT. Gramedia.
- Tanawuwong, K. and W. Tewaruth. 2009. Extraction and Application of Antioxidants from Black Glutinous Rice. *LWT-Food Science and Technology*. 43:476-481.

- Tjitrosoepomo, W. 2001. *Morfologi Tumbuhan*. Gadjah mada university Press.
- Tribelhorn, R. E. 1991. Breakfast Cereals (dalam *Handbook of Cereal Science and Technology*, K. J. Lorenz and K. Kulp (eds.). New York: Marcel Dekker.
- Troller, J. and J. H. B. Christian. 2012. *Water Activity and Food*. New York: Academic Press.
- Tsuda, T., F. Horio, J. Kitoh and T. Osawa. 1999. Protective Effects of Dietary Cyanidin-3-O- β -D-glucoside on Liver Ischemia-Reperfusion Injury in Rats. *Archives of Biochemistry and Biophysics*. 368: 361–366.
- Vaughan, D. A., B. Lu and N. Tomooka. 2008. *The Evolving Story of Rice Evolution*.
<http://www.sciencedirect.com/science/article/pii/S0167636908000166> (26 Februari 2016)
- Vincent, J.F.V. (1998). The Quantification of Crispness. *J. Sci. Food. and Agri*. Vol. 78, 162–168.
- Vyas, H. K. and P. S. Tong. 2004. Impact of Source and Level of Calcium Fortification on the Heat Stability of Reconstituted Skim Milk Powder. *J. Dairy Sci*. 87(5):1177-80.
- Winarno, F. G. 2002. *Kimia Pangan dan Gizi*. Jakarta: Gramedia.
- Winarno, F. G., S. Fardiaz, dan D. Fardiaz. 1980. *Pengantar Teknologi Pangan*. Jakarta: Penerbit PT. Gramedia.
- Wojtowicz, A., Marcin, M. Tomasz, O., Leszek, M., Magdalena, K., dan Anna, O. 2015. Selected Physical Properties, Texture and Sensory Characteristics of Extruded Breakfast Cereals Based on Wholegrain Wheat Flour. *J. Scie. and Agri. Sci.*. Vol 7. 301-308.
- Wrolstad, R.E., R.W. Durst and J. Lee. 2005. Tracking Color and Pigment Changes in Anthocyanin Products. *Trends in Food Science and Technology*. 16: 423-428.

- Yoder, C., Jill, P., Kimberly, W., Demetra S., Mitchell, S., Jennifer, G., dan Zachary, W. 2012. Dehydration and Tehydration of Carbonated folur and Hydroxylapatite. *J. Minerals*. Vol. 2 100-117.
- Yoshimura, Y., N. Zaima, T. Moriyama, and Y. Kawamura. 2012. Different Localization Patterns of Anthocyanin Species in the Pericarp of Black Rice Revealed by Imaging Mass Spectrometry. *PLoS ONE* 7(2): e31285. doi:10.1371/journal.pone.0031285. 1-9. William, W. 2012. Organising A Test. <http://foodafactolife.org.uk/sheet.aspx> (Diakses tanggal 10 Mei 2017).
- Yuwono, S. S. dan A. A. Zulfiah. 2015. Formulasi Beras Analog Berbasis Tepung Mocaf dan Maizena Dengan Penambahan CMC dan Tepung Ampas Tahu. *Jurnal Pangan dan Agroindustri*. 3(4): 1465-1472.
- Zawistowski, J., A. Kopec and D.D. Kitts. 2008. Effect of A Black Rice Extract (*Oryza sativa L. indica*) on Cholesterol Levels and Plasma Lipid Parameters in Wistar Kyoto Rats. *Journal of Functional Foods* I. 50-56.
- Zhao, H. Jia, C., Chengqi, L., Wei, S., Chao, C., dan Yongshen, R. 2015. Solubility of Calcium Carbonate in Ammonium Chloride Aqueous Solution at T= (298.15, 323.15, and 348.15) K. *J. Chem. Eng. Data*.
- Zhou, Z.K., K. Robards, S. Helliwell and C. Blanchard. 2004. The Distribution of Phenolic Acids in Rice. *J. Food Chem.* 87:401-406.