

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **5.1. Kesimpulan**

1. Perbedaan proporsi tepung beras hitam dan tepung ubi jalar ungu berpengaruh terhadap sifat fisik yaitu %daya serap air, tekstur (*fracturability* dan *crispness*), dan warna (*lightness*, *chroma*, dan *hue*)
2. Penggunaan tepung beras hitam yang lebih tinggi dibandingkan tepung ubi jalar ungu akan menyebabkan peningkatan %daya serap air, *fracturability*, *crispness* dan penurunan nilai *lightness*.
3. *Flakes* tepung beras hitam dan tepung ubi jalar ungu cenderung memiliki warna *red purple*
4. Perbedaan proporsi tepung beras hitam dan tepung ubi jalar ungu berpengaruh nyata terhadap sifat organoleptik yaitu warna, tesktur, rasa, dan *mouthfeel*.
5. Perlakuan terbaik yang dihitung berdasarkan luas permukaan terbesar *spider web* uji organoleptik adalah penggunaan proporsi 40:60 tepung beras hitam:tepung ubi jalar ungu

#### **5.2. Saran**

Perlu dilakukan penelitian lebih lanjut mengenai porositas *flakes*, senyawa penyebab *aftertaste* yang tidak diinginkan pada beras hitam dan ubi jalar ungu dan cara meminimalkan rasa tersebut sehingga *flakes* dapat diterima masyarakat selain itu, perlu dilakukan penelitian lebih lanjut mengenai penambahan senyawa maupun proporsi bahan yang tepat agar diperoleh *flakes* dengan tekstur *crispy* yang dapat bertahan lama namun menurunkan nilai *fracturability*.

## **DAFTAR PUSTAKA**

- Anonim, 2001. The Definition of Dietary Fibre. Cereal Foods World 46:pp. 89-148. [http://www.aaccnet.org/Dietary\\_Fiber/pdfs/\\_dietfiber.pdf](http://www.aaccnet.org/Dietary_Fiber/pdfs/_dietfiber.pdf). Diakses 10 Desember 2016
- Anonim. 2013. *Pedoman Teknis Pengelolaan Produksi Ubi Jalar dan Aneka Umbi* 2013. Direktorat Jendral Tanaman Pangan Kementerian Pertanian
- Antara, N.S. dan Wartini, M. 2012. Senyawa Aroma dan Cita Rasa (Aroma and Flavour Compounds). *Tropical Plants and Curriculum Project*. Udayana University
- Antarlina, S.S. 1998. Utilization of Sweet Potato Flour for Making Cookies and Cakes. dalam Hendroatmodjo, K. H., Y. Widodo, Sumaron, Guritno B. (Eds). 2004. Research accomplishment of Root Crops for Agricultural Development in Indonesia. Indonesia: Research institute for Legume and Tuber Crops, Jakarta. p: 13-23.
- Badan Standarisasi Nasional. 1995. *Standar Nasional Indonesia. Syarat Mutu Tepung Jagung*. SNI 01-3727-1995. Badan Standarisasi Nasional, Jakarta.
- Badan Standar Nasional Indonesia (SNI).01-4270-1996. *Syarat Mutu Sereal*. Dewan Standar Nasional. Jakarta.
- Bakke, A dan Z, Vickers. 2007. Consumer Liking of Refined and Whole Wheat Breads. *J. Food Sci*, 72: S473-S480.
- Boyer, C. D. and J. C. Shannon. 2003. *Carbohydrates of the kernel. Dalam: P. J. White dan L. A. Johnson (Editor)*. Corn: Chemistry and Technology. Second Edition. The American Assosiation of Cereal Chemist, Inc., Minnesota, USA. 289-312.
- Cahyono, 2004. Studi Pembuatan Permen Ubi Jalar Susu sebagai Alternatif Diversifikasi Pengolahan. Jurusan TPHP, FTP, UGM Yogyakarta.
- Chen, J dan J. Stokes . 2012. Rheology and tribology: two distinctive regimes of food texture sensation. *Food Science and Technology*, 25(1), 4—12.

- Chaunier L, Courcoux P, Valle G, Lourdin D. 2005. Physical and sensory evaluation of cornflakes crispness. *J Texture Studies*. 36(10):93-118.
- De La Torre, M., Barron, M. E., Riaz, M. N. and Rooney, L. W. 2003. *The Properties of Baked and Fried Tortilla Chips Fortified with Mechanically-expelled Soy Flour*. Poster Presented at AACC meeting. Portland USA, 28<sup>th</sup> September - 2nd October 2003.
- Direktorat Jenderal Tanaman Pangan. 2011. *Luas Tanam, Luas Panen, Produktivitas, dan Produksi Ubi Ungu* (ARAM II 2011). [http://tanamanpangan.deptan.go.id/doc\\_upload/Luas%20Tanam,%20Luas%20Panen,%20Produktifitas%20&%20Produksi%20Ubi%20Ungu%20\(Ara m%20II%202011\).pdf](http://tanamanpangan.deptan.go.id/doc_upload/Luas%20Tanam,%20Luas%20Panen,%20Produktifitas%20&%20Produksi%20Ubi%20Ungu%20(Ara m%20II%202011).pdf). Diakses 28 Mei 2016.
- Fisher, C. and Scott, T. R. 1997. *Food flavour: Biology and Chemistry*. UK: The Royal Society of Chemistry
- Ginting, E., Y. Widodo, S.A. Rahayuningsih, dan M. Yusuf. 2005. Karakteristik Pati Beberapa Varietas Ubi Jalar. *Jurnal Penelitian Pertanian Tanaman Pangan* 24 (1): 9-18.
- Goda, Y., T. Shimizu, Y. Kato, M. Nakamura, T. Maitani, T. Yamada, N. Terahara, dan M. Yamaguchi. 1997. Two acylated anthocyanins from purple sweet potato. 44: 183-186
- Hanum, T., 2000. *Ekstraksi dan Stabilitas Zat Pewarna Alami dari Ketul Beras Ketan Hitam (Oryza sativa glutinosa)*. Buletin Teknologi dan Industri Pangan, Vol. XI, 1. Universitas Bandar Lampung.
- Hutchings, J. B. 1999. Food Colour and Appearance 2nd edition (dalam Lutfika, Efrin. 2006. Evaluasi Mutu Gizi dan Indeks Glikemik Produk Olahan Panggang Berbahan Dasar Tepung Ubi Jalar (*Ipomoea batatas L.*) Klon Unggul BB00105.10. Skripsi, Institut Pertanian Bogor). Maryand: Aspen Pub.
- Herbst, S. T. 1995. *Oats*. [http://www.epicurious.com/cooking/how\\_to/food\\_dictionary/entry?id=3686](http://www.epicurious.com/cooking/how_to/food_dictionary/entry?id=3686). Diakses tanggal 9 Juni 2016.

- Hiemori, M., E. Koh, A.E. Mitchell. 2009. Influence of Cooking on Anthocyanins in Black Rice (*Oryza sativa L. japonica* var. SBR) *J. Agr Food Chem* 57:1908-1914.
- Hyun, J. W., and H.S. Chung, 2004, *Cyanidin and Malvidin from Oryza sativa cv. Heungjinjubyeo Mediate Cytotoxicity Against Human Monocytic Leucimia Cell by Arrest of G2/M phase and Induction of Apoptosis*, *J.Agric. Food Chem*, 52: 2213-2217.
- Ichikawa, H., T. Ichiyanagi, B. Xu, Y. Yoshii, M. Nakajima, T. Konishi. 2001. Antioxidant Activity of Anthocyanin Extract from Purple Black Rice, *J. Med. Food*, 4: 211–218.
- Jati, I.R.A.P.J. 2014. Improving the Consumption Pattern, Dietary Assesment Tool, and Food Quality: An Integrated Approaches to Enhance Nutrition Security in Indonesia, *Disertasi S-3*, Fakultät Naturwissenschaften, Universität Hohenheim.Jerman.
- Jiao Y., Y. Jiang, W. Zhai, dan Z. Yang. 2012, Studies on Antioxidant capacity of Anthocyanin Extract of Purple Sweet Potato (*Ipomoea batatas* L.), *African Journal of Biotechnology* Vol. 11(27), pp. 7046-7054
- Kartika, H. dan Supartono. 1988. *Pedoman Uji Inderawi Bahan Pangan*. PAU Pangan dan Gizi UGM. Yogyakarta. Hal: 30
- Kongruang, S. 2010. *Growth kinetics of biopigment production by Thai isolated Monascus purpureus in a stirred tank bioreactor*. *J Ind Microbiol Biotechnol*. 38:93–99.
- Kristamtini. 2010. Mengenal Beras Hitam dari Bantul. Diakses melalui <http://pustaka.litbang.deptan.go.id/bppi/lengkap/st130509.pdf> pada tanggal 25 November 2016
- Kumalaningsih, S. 2008. *Antioksidan, Sumber dan Manfaatnya. Antioxidant Center Online*. Diunduh tanggal 5 Juli 2016 dari <http://antioxidant.center/index.php/antioksidan/3.-antioksidan-sumbermanfaatnya.html>. Hal: 1-5.
- Kurniasih, A. 2016. Daya Patah dan Daya Terima *Flakes* Jagung yang Disubstitusi Tepung Jagung Pisang. *Skripsi S-1*, Fakultas Ilmu Kesehatan Universitas Muhammadiyah. Surakarta

- Kushwaha, Ujjawal, K.S. 2016. Black Rice Research, History and Development. Nepal: Springer (halaman. 75 dan 93)
- Kusnandar, F. 2010. Teknologi Modifikasi Pati dan Aplikasinya di Industri Pangan. <http://itp.fateta.ipb.ac.id/> (1 Desember 2016)
- Lawless HT., Heymann H. 1998. *Sensory Evaluation of Food: Principles and Practices*. New York, NY. Chapman & Hall; Press. Page.7-8.
- Lenggosari, P. 2008. Memahami Hue, Saturation, dan Lightness. <http://www.fotowarna.com>. (20 Februari 2016)
- Mano, H., Ogasawara F, Sato K, Higo H dan Minobe Y. 2007. *Isolation of a Regulation Gen of Anthocyanin Biosynthesis in Tuberous Roots Purple – Fleshed Sweet Potato*. Plant Physiol 143:1252-1268.
- Martin, C.P. 2011. Cross-Linking of Wheat Starch Improves The Crispness of Deep-Fried Battered Food . Food Hydrocolloids 28: 53-58.
- Meilgaard M, GV Civille & BT Carr. 1999. *Sensory Evaluation Techniques* New York: CRC Press.180-185
- Meyer, H.N, 1982. *Brine Shrimp Lethality Test Med. Plant Research. Vol. 45*. Page 31-34, Amsterdam: Hipokrates Verlag Gmbrl.
- Montilla, E.C.,S. Hillebrand,P. Winterhalter, 2011, Anthocyanins in Purple Sweet Potato (*Ipomoea batatas* L.) Varieties, Fruit, Vegetable and Cereal Science and Biotechnology 5 (Special Issue 2), 19-24.
- Moorthy, S.N., and C. Balagopalan. 2010. *Physicochemical Properties of Enzymatically Separated Starch from Sweet Potato*. Diakses dari [www.moorthy.co.in](http://www.moorthy.co.in).
- 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*. Program Pascasarjana Fakultas Teknologi Pertanian. Universitas Gadjah Mada. *Tesis*.
- Noda, T., S. Tsuda, M. Mori, and S. Takigawa. 2004. Properties of starches from potato varieties grown in Hokkaido. *Journal of Applied Glycoscience*. 51 : 241-246.

- Nollet, L.M.L. 1996. *Handbook of Food Analysis: Physical Characterization and Nutrient Analysis*. Marcell Dekker Inc, New York. 834-836
- Nur Hartuti dan R.M. Sinaga. 1998. *Keripik Kentang, Salah Satu Diversifikasi Produk*. Balitsa, Puslitbang Hortikultura, Badan Litbang Pertanian.
- Oxford University Press, 2008, *Flakes* (Oxford Learner's Pocket Dictionary, Bull, V.), Oxford University Press, United Kingdom.
- Park, J.K., Kim S.S. dan Kim K.O. (2001). *Effect of Milling Ratio on Sensory Properties of Cooked and on physico chemical Properties of Milled and Cooked Rice*. *Cereal Chemistry*. Vol 78 (2) pp. 151-156.
- Ranganna, S. 1979. *Manual of Analysis for Fruit and Vegetable Product*. Mc. Graw Hill Publishing Company Limited, New Delhi. 977-978
- Ricahana, N., Sunarti, dan Titi, C. 2004. Karakterisasi Sifat Fisikokimia Tepung Umbi dan Tepung Pati dari Umbi Ganyong, Suweg, Ubi Kelapa dan Gembili. *Jurnal Pascapanen* 1 (1) : 29-37
- Rumbaoa R. G. O, D. F. Cornago, and Geronimo I. M. 2009. Phenolic Content And Antioxidant Capacity Of Philippine Sweet Potato (*Ipomoea batatas*) Varieties. *J. Food Chem.* 113 : 1133 – 1138
- Ryu, S.N., Park, S.Z., and Ho, C.T. 1998. High Performance Liquid Chromatographic Determination of Anthocyanin Pigments in Some Varieties of Black Rice, *J. Food Drug Anal.* 6: 729–736.
- Shi, Z., L. Minn. and F. J. Farancis. 1992. *Stability of anthocyanins from tradescania pallida*. *Journal Food Science*. 57(3): 758-771.
- Soekarto, S.T. 1985. *Penilaian Organoleptik untuk Industri Pangan dan Hasil Pertanian*. Jakarta: Bharata Karya Aksara. Hal. 41-45
- Soemartono. 1984. *Ubi Jalar*. CV. Yasaguna, Jakarta. Hal: 44
- Sompeng, R., S. Siebenhandl-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.
- Steed, L.E dan V.D. Truong. 2008. Anthocyanin Content, Antioxidant Activity, and Selected Physical Properties of Flowable Purple Fleshed Sweet Potato Purees. *Journal of Food Science*, Vol. 73: 215-225.
- Stone, H. dan Sidel J. L. 2004. *Sensory Evaluation Practices*. 3rd ed. San Diego, CA. Elsevier Academic Press. 273
- Suda, I., T. Oki, M. Masuda, M. Kobayashi, Y. Nishiba, dan S. Furuta. 2003. Physiological Functionality Of Purple Fleshed Sweet Potatoes Containing Anthocyanins And Their Utilization In Foods. *JARQ* 37(3): 167-173.
- Suprapti L. 2003. *Tepung Ubi Jalar: Pembuatan dan Pemanfaatannya*. Yogyakarta: Kanisius. Hal. 16
- Susan, B. E. 2008. *The Relationship Between Breakfast and School Performance*.  
<http://clearinghouse.missouriwestern.edu/manuscripts/202.asp>.
- Suprapta, D. N. 2003. Ubi Jalar Ungu Mengandung Antioksidan Tinggi. <http://www.cybertokoh.com/mod.php?> (Diakses tanggal 05 Desember 2016).
- Swinkels, J. J. M. (1985). Sources of Starch, its Chemistry and Physics. Starch Conversion Technology. Marcel Dekker Inc., New York. 37 (1): 1-5.
- Syamsir, E. 2006. *Penuntun Praktikum Sereal Sarapan*. Bogor : Departemen Ilmu dan Teknologi Pangan, IPB.
- Tribelhorn R. E. 1991. *Breakfast cereals*. In : *Handbook of Cereal Science and Technology*. New York : Marcel Dekker inc. Page: 741-762
- Trisyulianti, E., J. Jacjha dan Jayusmar. 2001. Pengaruh suhu dan tekanan pengempaan terhadap sifat fisik wafer ransum dari limbah pertanian sumber serat dan leguminose untuk ternak ruminansia. *Media Peternakan* 24(3): 76 – 81.

- Tsou, S.C.S. and T.L. Hong. 1989. *Digestibility of sweet potato starch. Improvement of Sweet Potato (*Ipomoea batatas*) in Asia.* CIP, Lima, Peru. p. 127–136.
- UKM Kusuka Ubiku. 2016. *Proses Penepungan Ubi Jalar Ungu, Komunikasi Langsung.*
- USDA *Nutrient Database for Standard Reference [Internet].* U.S. Department of Agriculture, Agricultural Research Service. 2010. Available from: <http://www.nal.usda.gov/fnic/foodcomp>. Accessed 2016 June 01.
- Xiao, Q. C. 2013. *Identification and Antioxidant Capacity of Anthocyanin Pigment, and Expressional Analysis of Flavonoid Biosynthetic Genes in Colored Rice Strains.* Diakses 26 Juni 2016. <http://harp.lib.hiroshima.ac.jp/bitstream/harp/11940/1/Sdoctor201303.pdf>.
- Yeu K, Y. Lee , S. Y. Lee. 2008. Consumer Acceptance of an Extruded Soy-BasedHigh-Protein Breakfast Cereal. *J. Food Sci.*, 73(1): S20-S25.
- Yoshinaga, M. 1995. *New Cultivar "Ayamurasaki" for Colorant Production Sweet Potato.* Research Front No.1 : 2
- Zhang, Ming-wei., Bao-jiang Guo, Rui-fen Zhang, Jian-wei Chi, Zhen-cheng Wei, Zhi-hong Xu, Yan Zhang, dan Xiao-jun Tang. 2010. Separation, Purification and Identification of Antioxidant Compositions in Black Rice. *J. Agricultural Science in China* 5(6): 431-440