

BAB V

PENUTUP

5.1 Kesimpulan

Berdasarkan penelitian yang telah dilakukan dapat diambil kesimpulan sebagai berikut :

1. Pengaruh HMT terhadap kadar pati resisten pati kimpul yaitu, HMT dapat meningkatkan kadar RS pati kimpul. Kadar pati resisten pati kimpul berkisar antara 1,41%-1,71%, perlakuan terbaik yaitu pada perlakuan suhu modifikasi 60 °C yaitu sebesar 1,71%.
2. Komposisi biskuit hasil uji biologis dan kimia (substitusi 50% PKM) adalah sebagai berikut: kadar air 1,5%, kadar abu 0,76%, protein 4,6%, lemak 17,82%, karbohidrat 43,79%, serat pangan 10,7%. Kadar RS pada biskuit substitusi 50% PKM (2,31%) lebih tinggi dua kali lipat dibandingkan biskuit substitusi 50% pati kimpul tanpa modifikasi (0,97%). Dan biskuit pati kimpul yang paling disukai yaitu perlakuan substitusi 50% pati kimpul tanpa modifikasi pada parameter warna dan tekstur dengan nilai rata-rata pada parameter warna yaitu 6,2 dan tekstur 5,1 dan untuk parameter aroma dan rasa yang paling disukai yaitu pada perlakuan substitusi 50% pati kimpul modifikasi dengan nilai rata-rata pada parameter rasa yaitu 5,93 dan aroma 5,1. Biskuit terbaik substitusi pati kimpul ditinjau dari kadar pati resisten yaitu berada pada perlakuan substitusi 50% pati kimpul tanpa modifikasi dengan penggunaan pati kimpul modifikasi dalam substitusi biskuit.

2.2 Saran

. Perlu dilakukan penelitian lanjutan mengenai substitusi PKM untuk mempersempit kisaran substitusi, misalnya 65%, 70%, 75%, 85%, 90% dan 95%. Hal ini disebabkan semakin banyak PKM yang digunakan pada pembuatan biskuit maka potensinya sebagai pangan fungsional semakin besar karena jumlah RS yang tinggi dapat memberikan potensi prebiotik yang semakin baik dan daya cerna yang lebih rendah menjadikan produk biskuit substitusi PKM berpotensi sebagai *snack* sehat

DAFTAR PUSTAKA

- Andarwulan, N., F.Kusnandar & D. Herawati. 2011. *Analisis Pangan*. Dian Rakyat, Jakarta.
- Anderson AK, Guraya HS, James C, Salvaggio L. 2002. *Digestibility and pasting properties of rice starch heat-moisture treated at the melting temperature (T_m)*. *Joernal Starch/Starke* 54: 401-409.
- AOAC. 1995. *Official Methods of Analysis 960.52 Modified*, Chapter 12.1.07, p7. Washington, DC.2006. *Official Methods of Analysis of The Association of Official Analytical Chemists*. Washington, DC.
- AOAC. 2007. *Official Methods of Analysis OF AOAC International. 18th Edition*. Gaithersburg: AOAC International.
- Asp NG, Johansson CG, Hallmer H, Siljestrom. 1983. Rapid enzymatic assay of insoluble and soluble dietary fiber. *Journal of Agricultural Food Chemistry* 31:476-482.
- Ayu, Disafitri Candra dkk. 2014. *Pengaruh Suhu Blansing dan Lama Perendaman terhadap Sifat Kimia Tepung Kimpul (Xanthosoma Sagottifolium)*. *Jurnal Pangan dan Agroindustri Jurusan Teknologi Hasil Pertanian Fakultas Teknologi Pertanian Universitas Brawijaya Malang*. Vol. 2, NO. 2, Hal 110-120.
- Balasubramanian S, Sharma R, Kaur J, Bhardawaj N. 2014. *Characterization of modified pearl millet (Pennisetum typhoides) starch*. *J Food Sci Technol* 51: 294-300. DOI: 10.1007/s13197-011- 0490-1.
- Berry CS. 1986. Resistant starch: formation and measurement of starch that survives exhaustive digestion with amylolytic enzymes during the determination of dietary fiber. *Journal of Cereal Science* 4: 301–314.
- Brouns, F., Kettlitz, B. & Arrigoni, E., 2002. Resistant starch and “The Butyrate Revolution”. *Trends in Food Science & Technology* 13: 251-261.
- Brown IL, Wang X, Playne MJ, Conway PL. 1998. *High amylase maize starch as a versatile prebiotic for use with probiotic bacteria*. *Food Aust.* 50: 602-609.
- [BSN] Badan Standarisasi Nasional. 1992. *SNI Mutu dan Cara Uji Biskuit (SNI 2973-2011)*. Jakarta: BSN.
- Chung H, Liu Q. 2009. *Impact of molecular structure of amylopectin and amylose on amylose chain association during cooling*. *Carbohydrate Polymers* 77: 807–815.

- Collado, L.S., L.B. Mabesa, C.G. Oates and H. Corke. 2001. *Bihon-type of noodles from heat-moisture treated sweet potato starch*. J of Food Sci. 66(4) : 604-609
- Escarpa A., Gonzalez MC, Manas E, García-Diz L, Saura-Calixto F. 1996. *Resistant starch formation: Standardization of a high-pressure autoclave process*. Journal of Agricultural and Food Chemistry 44: 924–928.
- Glicksman, M. 1969. *Gum Technology in the Food Industry*. Academic Press, New York.
- Goni I, Garcia-Diz L, Mafias E, Saura-Calixto F. 1996. *Analysis of resistant starch: a method for foods and food products*. Food Chemistry Volume 56: 445 – 449.
- Gonzales-Soto RA, Agama-Acevedo E, Solorza-Feria J, Rendon-Villalobos R, Bello-Perez LA. 2004. *Resistant starch made from bananan starch by autoclaving and debranching*. Journal Starch. 56: 495-499.
- Gunaratne, A., R. Hoover. 2002. *Effect of heat–moisture treatment on the structure and physicochemical properties of tuber and root starches*. Carbohydrate Polymer 49: 425-437.
- Gunorubon AJ, Kekpugile DK. 2012. *Modification of cassava starch for industrial uses*. Int Journal Eng Technol 2: 913-919.
- Herawati, Dian. 2009. *Modifikasi Pati Sagu dengan Teknik Heat Moisture Treatment (HMT) dan Aplikasinya dalam Memperbaiki Kualitas Bihun*. Pasca Sarjana. Institut Pertanian Bogor. Bogor.
- Hoover, R. dan H. Manuel. 1996. *Effect of Heat Moisture Treatment on The Structure and Physicochemical Properties of Legume Starches*. Food Research International, 29, 731-750.
- Jacobs, H. and J.A. Delcour. 1998. *Hydrothermal modifications of granular starch, with retention of the granular structure: a review*. Journal. Agric. Food Chem. 46(8): 2895–2905.
- Jatmiko, G. P dan T. Estiasih. 2014. *Mie dari Ubi Kimpul (xanthosoma sagittifolium) : Kajian Pustaka*. Jurnal Pangan dan Agroindustri. Vol. 2 No. 2 : 127-134.
- Koswara, S. 2013. *Teknologi Pengolahan Umbi-Umbian*. Bagian I: Pengolahan Umbi Talas. Southeast Asian Food and Agriculture Science and Technology (SEAFAST) Centre Research and Community Service Institution Bogor Agriculture University. <http://seafast.ipb.ac.id>.
- Lee, Chang Jo, Yang Kim, Seung Jun Choi, Tae Wha Moon. (2012). *Slowly Digestible Starch from Heat-Moisture Treated Waxy Potato Satrch* :

- Preparation, Structural Characteristic, and Glucose response in mice. Food Chemistry Journal* 133: 1222-1229.
- Lehmann U, Jacobasch G, Schmiedl D. 2002. *Characterization of resistant starch type III from banana (Musa acuminata)*. *Journal of Agricultural and Food Chemistry* 50: 5236–5240.
- Lorlowhakarn, K and Naivikul, O. (2006). *Modification of Rice Flour by Heat Moisture Treatment (HMT) to Produce Rice Noodles*. *Kasetsart Journal (Nat. Sci.)* 40 (Suppl.) : 135 – 143.
- Manning TS, Gibson GR. 2004. *Prebiotics*. *Best Practice & Research Clinical Gastroenterology* 18(2):287-298.
- Manley D.1998. *Technology of Biscuit, Cracker, Cookie Recipe for The Industry*. 4th Edition. England: Woodhead Ltd and CRC Press LLC.
- Mayasari, N. 2010. *Pengaruh Substitusi Larutan Asam dan Garam sebagai Upaya Reduksi Oksalat* . Skripsi. Fakultas Teknologi Pertanian-IPB. Bogor.
- Martins, S. I., Jongen, W. M., & van Boekel, M. A. (2001). *A review of Maillard reaction in food and implications to kinetic modelling*. *Trends in Food Science & Technology* , 11, 364–373.
- Matz SA, Matz TD. 1978. *Cookie and Cracker Technology*. Westport, Connecticut: The AVI Publishing Co. Inc.
- Miftahur Rahmah. 2015. *Pengembangan Produk Nugget Jamur Tiram Tinggi Protein Dan Kaya Serat Melalui Pemanfaatan Tepung Tempe Kacang Merah*. Skripsi. Institut Pertanian Bogor.
- Nadir AS, Helmy IMF, Nahed M, Abdelmaguid, Wafaa MM, Abozeid, Ramadan MT. 2015. *Modification of potato starch by some different physical methods and utilization in cookies production*. *Int J Curr Microbiol App Sci* 4: 556-569.
- Nugent AP. 2005. *Health properties of resistant starch*. *Nutrition Bulletin* 30: 27-54.
- Pukkahuta, C., S. Varavinit. 2007. *Structural transformation of sago starch by heatmoisture and osmotic-pressure treatment*. *Starch-stärke* 59:624-631.
- Purwania, E.Y., Widaningruma, Thahira R., and Muslich. 2006. *Effect of heat moisture treatment of sago starch on its noodle quality*. *Indonesian Journal of Agricultural Science* 7(1): 8-14.

- Saguilan. 2005. *Resistant starch-rich powders prepared by autoclaving of native and lintherized banana starch: partial characterization. Journal Starch* 57: 405 – 412.
- Sajilata, Singhai MGRS, Kulkarni PR. 2006. *Resistant starch: A review. Comprehensive Reviews in Food Science and Food Safety* Vol 5.
- Schoch, T.J. dan E.C. Maywald, 1968. Di dalam Collado, L.S. dan Corke, H. 1999. *Heat-moisture treatment Effects on Sweetpotato Starches Differing in Amylose Content. Food Chemistry* 65: 339 – 346.
- Setyawan, B. 2015. *Budidaya Umbi-umbian Padat Nutrisi. Pustaka Baru Press. Yogyakarta.*
- Shamai K, Peled HB, Shimon E. 2003. *Polymorphism of resistant starch type III. J Carbohydrate Polymer* 54: 363-369.
- Shin S, Byun J, Park KW, Moon TW. 2004. *Effect of partial acid and heat moisture treatment of formation of resistant tuber starch. Journal. Cereal Chemistry* 81(2): 194-198.
- Soekarto ST. 1995. *Penilaian Organoleptik untuk Industri Pangan dan Hasil Pertanian. Jakarta: Bharata Karya Aksara.*
- Syamsir, E., P. Hariyadi, D. Fardiaz, N. Andarwulan dan F. Kusnandar. 2012. *Pengaruh proses heat-moisture treatment (HMT) terhadap karakteristik fisikokimia pati. Journal. Teknol. dan Industri Pangan* 28(1): 100-106.
- Tharanathan RN. 2002. Food-derived carbohydrates: Structural complexity and functional diversity. *Critical Reviews in Biotechnology* 22(1): 65–84.
- Thompson DB. 2000. *On the non-random nature of amylopectin branching. Carbohydrate Polymers* 43: 223–239.
- Vail GE, Philips JA, Rust LD, Griswold RM, Justin M. 1978. *Foods. Boston: Houghton Mifflin Company.*
- Whiteley PR. 1971. *Biscuit Manufacture: Fundamental of In-Line Production. London: Applied Science Publishing Ltd.*
- Winarno F. G. 2011. *Kimia Pangan dan Gizi. Gramedia, gramedia pustaka utama. Jakarta.*
- Wright AV, Ouwehand A (eds.). 2004. *Lactic Acid Bacteria: Microbiological and Functional Aspects. Ed ke-3, Revised and Expanded. New York: Marcel Dekker Inc.*