

V. KESIMPULAN DAN SARAN

5.1. Kesimpulan

1. Perbedaan konsentrasi pati sagu berpengaruh terhadap kadar air, aktivitas air (A_w), daya rehidrasi, kekeruhan, dan tekstur (daya patah) *edible spoon* berbasis tepung bekatul.
2. Peningkatan konsentrasi pati sagu meningkatkan kadar air *edible spoon* berbasis tepung bekatul yang berkisar antara 7,73-11,93%.
3. Peningkatan konsentrasi pati sagu menurunkan aktivitas air (A_w) *edible spoon* berbasis tepung bekatul yang berkisar antara 0,268-0,823.
4. Peningkatan konsentrasi pati sagu menurunkan daya rehidrasi *edible spoon* berbasis tepung bekatul yang berkisar antara 21,48-28,1% (menit ke-5); 31,25-39,8% (menit ke-10); 38,48-47,17% (menit ke-15); 44,37-55,63% (menit ke-20); dan 47,99-63,24% (menit ke-25).
5. Peningkatan konsentrasi pati sagu menurunkan kekeruhan air rendaman *edible spoon* berbasis tepung bekatul pada kondisi suhu berbeda, berkisar antara 7,31-10,65 NTU (suhu rendah 5-10°C), 11,11-18,69 NTU (suhu ruang 25-30°C), dan 29,8-38 NTU (suhu tinggi 60-65°C).
6. Peningkatan konsentrasi pati sagu meningkatkan daya patah *edible spoon* berbasis tepung bekatul yang berkisar antara 5,679-11,98 N.

5.2. Saran

Perlu dilakukan penelitian lebih lanjut untuk mengetahui penerimaan dan tingkat kesukaan masyarakat terhadap sifat sensoris *edible spoon* berbasis tepung bekatul.

DAFTAR PUSTAKA

- Aguilera, J. M. (2016). *Edible Structures: The Basic Science of What We Eat*. CRC Press.
- Annafiz, M. R. I. H., Dewi, E. N., & Purnamayati, L. (2020). The Effect of Addition Swimming Crab Shells Flour (*Portunus pelagicus*) for Physical and Chemical Quality of Edible Spoon. *Indonesian Journal of Fisheries Science and Technology*, 16(3), 165-170.
- Aris, F. & Pangesthi, L. T. (2019). Pengaruh Substitusi Tepung Bekatul dan Jenis *Shortening* terhadap Sifat Organoleptik *Roll Cake*. *Jurnal Tata Boga*, 8(3), 425-432.
- Arismawanti, P., Irmayanti, & Chairuni, A. R. (2021). Formulation for Making *Edible Spoon* with Additional Variants of Natural Dye Extractand Cinnamon Powder (*Cinamomum burmanii*) as Anti-Microbial. *Serambi Journal of Agricultural Technology*, 3(2), 96-106.
- Badan Standardisasi Nasional. (1995). *Tepung sagu*.
- Beckman, B. L. (2016). *Edible spoons promise to be tasty while saving the planet*. <https://mashable.com/article/edible-spoon-bakeys>. Diakses pada 31 Juli 2022.
- Biduski, B., da Silva, W. M. F., Colussi, R., Halal, S. L. d. M. E., Lim, L., Dias, Á. R. G., & Zavareze, E. d. R. (2018). Starch hydrogels: The influence of the amylose content and gelatinization method. *International Journal of Biological Macromolecules*, 113, 443-449.
- Castanha, N., Rojas, M. L., & Augusto, P. E. D. (2021). An insight into the pasting properties and gel strength of starches from different sources: effect of starch concentration. *Scientia Agropecuaria*, 12(2), 203-212.
- Cervini, M., Frustace, A., Garrido, G. D., Rocchetti, G., & Giuberti, G. (2021). Nutritional, physical and sensory characteristics of gluten-free biscuits incorporated with a novel resistant starch ingredient. *Heliyon*, 7(2021), 1-7.
- Chang, Q., Zheng, B., Zhang, Y., & Zeng, H. (2021). A comprehensive review of the factors influencing the formation of retrograded starch. *International Journal of Biological Macromolecules*, 186(2021), 163-173.
- Charles, A. L., Motsa, N., & Abdillah, A. A. (2022). A Comprehensive Characterization of Biodegradable Edible Films

- Based on Potato Peel Starch Plasticized with Glycerol. *Polymers*, 14(3462), 1-14.
- Choeybundit, W., Shiekh, K. A., Rachtanapun, P., & Tongdeesoonorn, W. (2022). Fabrication of edible and biodegradable cutlery from morning glory (*Ipomoea aquatic*) stem fiber-reinforced onto soy protein isolate. *Heliyon*, 8(2022), 1-8.
- Chowdhury, G. R., Dutta, S., Pal, N., & Mitra, A. (2021). Edible Cutlery: Futuristic Dining to Functional Sustenance. *Parana Journal of Science and Education*, 7(8), 84-91.
- Cicilia, S., Basuki, E., Alamsyah, A., Yasa, I. W. S., Dwikasari, L. G., & Suari, R. (2021, January). Sifat Fisik dan Daya Terima Cookies dari Tepung Biji Nangka Dimodifikasi. *Prosiding SAINTEK* (Vol. 3). LPPM Universitas Mataram.
- Coritama, C., Pranata, F. S., & Swasti, Y. R. (2021). Manfaat Bekatul Beras Putih dan Angkak dalam Pembuatan Cookies dan Roti. *MJNF*, 2(1), 43-57.
- Cornejo-Ramírez, Y. I., Martínez-Cruz, O., Toro-Sánchez, C. L. D., Wong-Corral, F. J., Borboa-Flores, J., & Cinco-Moroyoqui, F. J. (2018). The structural characteristics of starches and their functional properties. *CYTA – Journal of Food*, 16(1), 1003-1017.
- Dewi, R. K., Bintoro, M. H., & Sudradjat. (2016). Karakter Morfologi dan Potensi Produksi Beberapa Akses Sagu (*Metroxylon* spp.) di Kabupaten Sorong Selatan, Papua Barat. *Jurnal Agronomi Indonesia*, 44(1), 91-97.
- Erkmen, O. & Bozoglu, T. F (Eds). (2016). Food Preservation by Reducing Water Activity. In *Food Microbiology: Principles into Practice* (pp. 44-58). John Wiley & Sons, Ltd.
- Ernawati, E., Heliawaty, & Diansari, P. (2018). Peranan Makanan Tradisional Berbahan Sagu sebagai Alternatif dalam Pemenuhan Gizi Masyarakat: Kasus Desa Laba, Kecamatan Masamba, Kabupaten Luwu Utara, Provinsi Sulawesi Selatan. *Jurnal Sosial Ekonomi Pertanian*, 14(1), 31-40.
- Fatah, A., Rahmi, A., & Biantary, M. P. (2015). Tinjauan Potensi Tanaman Sagu (*Metroxylon sagu* Rottb) sebagai Komoditas Unggulan di Kabupaten Paser. *Media Sains*, 8(2), 158-167.
- Giwa, S. O., Ertunc, S., Alpbaz, M., & Hapoglu, H. (2012). Electrocoagulation Treatment of Turbid Petrochemical Wastewater. *International Journal of Advances in Science and Technology*, 5(5), 23-32.

- Gultom, S. S. T., Ambarita, H., Gultom, M. S., & Napitupulu, F. H. (2019). Rancang Bangun dan Pengujian Pengering Biji Kopi Tenaga Listrik dengan Pemanfaatan Energi Surya. *Jurnal Dinamis*, 7(4), 11-20.
- Hartati, S., Marsono, Y., Suparmo, & Santoso, U. (2015). Komposisi Kimia serta Aktivitas Antioksidan Ekstrak Hidrofilik Bekatul Beberapa Varietas Padi. *Agritech*, 35(1), 35-42.
- Hedayati, S. & Niakousari, M. (2018). Microstructure, pasting and textural properties of wheat starch-corn starch citrate composites. *Food Hydrocolloids*.
- Hidayat, Y. A., Kiranamahsa, S., & Zamal, M. A. (2019). A study of plastic waste management effectiveness in Indonesia industries. *AIMS Energy*, 7(3), 350-370.
- Hildayanti, T. M. & Pangesthi, L. T. (2017). Pengaruh Substitusi Bekatul dan Jenis *Shortening* terhadap Sifat Organoleptik Sus Kering. *Jurnal Tata Boga*, 5(1), 20-39.
- Istianah, N., Fitriadinda, H., & Murtini, E. S. (2019). *Perancangan Pabrik untuk Industri Pangan*. UB Press.
- Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768-771.
- Jumanah, J., Maryanto, M., & Windrati, W. S. (2017). Karakterisasi Sifat Fisik, Kimia, dan Sensoris Bihun Berbahan Tepung Komposit Ganyong (*Canna edulis*) dan Kacang Hijau (*Vigna radiata*). *Jurnal Agroteknologi*, 11(2), 128-138.
- Kahraman, K., Aktas-Akyildiz, E., Ozturk, S., & Koksel, H. (2019). Effect of different resistant starch sources and wheat bran on dietary fibre content and *in vitro* glycaemic index values of cookies. *Journal of Cereal Science*, 90(2019), 1-6.
- Kania, W., Andriani, M. A. M., & Siswanti. (2015). Pengaruh Variasi Rasio Bahan Pengikat terhadap Karakteristik Fisik dan Kimia Granul Minuman Fungsional Instan Kecambah Kacang Komak (*Lablab purpureus* (L.) sweet). *Jurnal Teknosains Pangan*, 4(3), 16-29.
- Kusnandar, F. (2019). *Kimia Pangan Komponen Makro*. Bumi Aksara.
- Leviana, W. & Paramita, V. (2017). Pengaruh Suhu terhadap Kadar Air dan Aktivitas Air dalam Bahan pada Kunyit (*Curcuma longa*) dengan Alat Pengering *Electrical Oven*. *METANA*, 13(2), 37-44.

- Li, C., Dhital, S., Gilbert, R. G., & Gidley, M. J. (2020). High-amylose wheat starch: Structural basis for water absorption and pasting properties. *Carbohydrate Polymers*, 245(2020), 1-11.
- Lukman, I., Huda, N., & Ismail, N. (2009). Physicochemical and sensory properties of commercial chicken nuggets. *Asian Journal of Food and Agro-Industry*, 2(2), 171-180.
- Luna, P., Herawati, H., Widowati, S., & Prianto, A. B. (2015). Pengaruh Kandungan Amilosa terhadap Karakteristik Fisik dan Organoleptik Nasi Instan. *Jurnal Penelitian Pascapanen Pertanian*, 12(1), 1-10.
- Luthfianto, D., Noviyanti, R. D., & Kurniawati, I. (2017, September). Karakterisasi Kandungan Zat Gizi Bekatul pada Berbagai Varietas Beras di Surakarta. In *Proceeding 6th University Research Colloquium 2017*. Universitas Muhammadiyah Magelang.
- Makhlouf, S., Jones, S., Ye, S., Sancho-Madriz, M., Burns-Whitmore, B., & Li, Y. O. (2019). Effect of selected dietary fibre sources and addition levels on physical and cooking quality attributes of fibre-enhanced pasta. *Food Quality and Safety*, 2019(3), 117-127.
- Makmur, S. A. (2018). Penambahan Tepung Sagu dan Tepung Terigu pada Pembuatan Roti Manis. *Gorontalo Agriculture Technology Journal*, 1(1), 1-9.
- Malumba, P., Doran, L., Danthine, S., Blecker, C., & Béra, F. (2018). The effect of heating rates on functional properties of wheat and potato starch-water systems. *Food Science and Technology*, 88(2018), 196-202.
- Mandei, J. H. (2016). Penggunaan Pati Sagu Termodifikasi dengan *Heat Moisture Treatment* sebagai Bahan Substitusi untuk Pembuatan Mi Kering. *Jurnal Penelitian Teknologi Industri*, 8(1), 57-72.
- Martens, B. M. J., Gerrits, W. J. J., Bruininx, E. M. A. M., & Schols, H. A. (2018). Amylopectin structure and crystallinity explains variation in digestion kinetics of starches across botanic sources in an in vitro pig model. *Journal of Animal Science and Biotechnology*, 9(91), 1-13.
- Natarajan, N., Vasudevan, M., Velusamy, V. V., & Selvaraj, M. (2019). Eco-Friendly and Edible Waste Cutlery for Sustainable Environment. *International Journal of Engineering and Advanced Technology*, 9(1S4), 615-624.

- Nisah, K. (2017). Study Pengaruh Kandungan Amilosa dan Amilopektin Umbi-Umbian terhadap Karakteristik Fisik Plastik Biodegradable dengan *Plastizicer* Gliserol. *Jurnal Biotik*, 5(2), 106-113.
- Nogueira, G. F., Leme, B. d. O., Santos, G. R. S. d., Silva, J. V. d., Nascimento, P. B., Soares, C. T., Fakhouri, F. M., & Oliveira, R. A. d. (2021). Edible Films and Coatings Formulated with Arrowroot Starch as a Non-Conventional Starch Source for Plums Packaging. *Polysaccharides*, 2021(2), 373-386.
- Odeyemi, O. A., Alegbeleye, O. O., Strateva, M., & Stratev, D. (2020). Understanding spoilage microbial community and spoilage mechanisms in foods of animal origin. *Comprehensive Reviews in Food Science and Food Safety*, 2020, 1-21.
- Okazaki, M. (2018). The Structure and Characteristics of Sago Starch. In *Sago Palm* (pp. 247-259). Japan Soil Research Institute Inc.
- Patil, H. N. & Sinhal, P. (2018). A study on edible cutlery: An alternative for conventional ones. *Atithya: A Journal of Hospitality*, 4(1), 45-51.
- Poonia, A. & Yadav, P. (2017). Trends in Edible Cutlery and Tableware. *Beverage & Food World*, 44(10), 36-38.
- Rajendran, S. P., Saravanan, A., Namachivayam, G. K., Jambunathan, J., & Ramachandran, G. (2020, May). Optimization of composition for preparation of edible cutlery using response surface methodology (RSM). In *AIP Conference Proceedings* (Vol. 2240, p. 050001). AIP Publishing.
- Sagu Tani. (2021). Specs Sagu Tani Bogor. <https://www.sagutani.com/our-flours/>. Tanggal akses 22 September 2022.
- Sari, A. R., Martono, Y., & Rondonuwu, F. S. (2020). Identifikasi Kualitas Beras Putih (*Oryza sativa* L.) Berdasarkan Kandungan Amilosa dan Amilopektin di Pasar Tradisional dan “Selepan” Kota Salatiga. *Titian Ilmu: Jurnal Ilmiah Multi Sciences*, 12(1), 24-30.
- Singhal, R. S., Kennedy, J. F., Gopalakrishnan, S. M., Kaczmarek, A., Knill, C. J., & Akmar, P. F. (2007). Industrial production, processing, and utilization of sago palm-derived products. *Carbohydrate Polymers*, 72(2008), 1-20.
- Sondari, D., Kusumaningrum, W. B., Akbar, F., Muawanah, A., Zulfikar, R., Fahmiati, S., Sampora, Y., & Putri, R. (2020). Penambahan Fraksi Amilosa terhadap Sifat Fisik dan Mekanis

- Edible Film Pati Tapioka. *Jurnal Kimia dan Kemasan*, 42(2), 78-84.
- Subroto, E., Jeanette, G., Meiyanasari, Y., Luwinsky, I., & Baraddiaz, S. (2020). Review on the Analysis Methods of Starch, Amylose, Amylopectinin Food and Agricultural Products. *International Journal of Emerging Trends in Engineering Research*, 8(7), 3519-3524.
- Sudarmadji, S., Haryono, B., & Suhardi. (2010). *Prosedur Analisa untuk Bahan Makanan dan Pertanian*. Liberty.
- Tapia, M. S., Alzamora, S. M., & Chirife, J. (2020). Effects of Water Activity (a_w) on Microbial Stability as a Hurdle in Food Preservation. In *Water Activity in Foods: Fundamentals and Applications, Second Edition* (pp. 323-355). John Wiley & Sons, Ltd.
- Taus, A. L., Tahuk, P. K., & Kita, K. W. (2022). Pengaruh Penggunaan Bahan Pengikat yang Berbeda terhadap Daya Ikat Air, Kadar Air dan Kandungan Serat Kasar Nugget Ayam. *Journal of Tropical Animal Science and Technology*, 4(1), 74-81.
- Triandita, N. & Putri, N. E. (2020). Proximate Composition and Glycaemic Index of Cookies from Corn Flour Mixed Black Soybeans. In *IOP Series: Earth and Environmental Science* (Vol. 515, p. 012053). IOP Publishing.
- Tuarita, M. Z., Sadek, N. F., Sukarno, Yuliana, N. D., & Budijanto, S. (2017). Pengembangan Bekatul sebagai Pangan Fungsional: Peluang, Hambatan, dan Tantangan. *PANGAN*, 26(2).
- Ulfah, T., Pratama, Y., & Bintoro, V. P. (2018). Pengaruh Proporsi Kemangi terhadap Aktivitas Air (A_w) dan Kadar Air Kerupuk Kemangi Mentah. *Jurnal Teknologi Pangan*, 2(1), 55-58.
- Zailani, M. A., Kamilah, H., Husaini, A., Seruji, A. Z. R. A., & Sarbini, S. R. (2021). Functional and digestibility properties of sago (*Metroxylon sagu*) starch modified by microwave heat treatment. *Food Hydrocolloids*, 122(2022), 1-9.