

## **BAB VI**

### **KESIMPULAN DAN SARAN**

#### **4.1. Kesimpulan**

1. Lama pengukusan beras varietas IR 64 berpengaruh nyata terhadap produksi pigmen *Monascus* sp. BST1.
2. Pengukusan selama 30 menit menghasilkan beras dengan kadar air yang paling optimal untuk pertumbuhan dan produksi pigmen *Monascus* sp. BST1.
3. Pengukusan beras IR 64 selama 30 menit menghasilkan total kapang yang paling tinggi (7,1709 log cfu/g).
4. Pengukusan beras IR 64 selama 30 menit menghasilkan kadar pigmen larut air yang paling tinggi baik pigmen kuning (85,70 AU/g), oranye (12,60 AU/g), maupun merah (12,33 AU/g).
5. Pengukusan beras IR 64 selama 30 menit menghasilkan kadar pigmen larut etanol yang paling tinggi baik pigmen kuning (754,25 AU/g), oranye (142,50 AU/g), maupun merah (177,50 AU/g).

#### **4.2. Saran**

Perlu dilakukan penelitian mengenai derajat gelatinisasi pati pada beras IR 64 sebagai media pertumbuhan *Monascus* sp. BST1.

## DAFTAR PUSTAKA

- Balai Besar Penelitian Tanaman Padi. 2008. Mutu Gizi Beras Kristal. *Warta Penelitian dan Pengembangan Pertanian*, 30(6), 8-10.
- Babitha, S., C.R. Soccol, and A. Pandey. 2006. Jackfruit Seed – A Novel substrate for the Production of *Monascus* Pigments through Solid-State Fermentation. *Food Technology and Biotechnology*, 44(4), 465-471.
- Blanc, P.J., Loret, M.O., and Goma, G. 1997. Pigments and Citrinin Production During Cultures of *Monascus* in Liquid and Solid Media. *Advance in Solid State Fermentation*, 32, 393-406.
- Borglum, G.B. 2012. *Starch Hydrolysis for Ethanol Production*. [http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/25\\_4\\_SAN%20FRANCISCO\\_08-80\\_0264.pdf](http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/25_4_SAN%20FRANCISCO_08-80_0264.pdf) (29 Desember 2012).
- Carvalho, J.C., B.O. Oishi, A. Pandley, and C.R. Soccol. 2005. Biopigments from *Monascus*: Strains Selection, Citrinin Production, and Color Stability. *Brazilian Archives of Biology and Technology*, 48(6), 885-894.
- Carvalho, J.C., B.O. Oishi, A.L. Woiciechowski, A. Pandley, S. Babitha, and C.R. Soccol. 2007. Effect of Substrates on the Production of *Monascus* Biopigments by solid-state fermentation and Pigment Extraction Using Different Solvents. *Indian Journal of Biotechnology*, 6, 194-199.
- Chairote, E., G. Chairote, S. Wongpornchai, and S. Lumyong. 2007. Preparation of Red Yeast Rice Using Various Thai Glutinous Rice and *Monascus purpureus* CMU001 Isolated from Commercial Chinese Red Yeast Rice Sample. *King Mongkut's Institute of Technology Ladkrabang, Journal of Science and Technology*, 7(S1), 28-37.
- Daomukda, N., A. Moongngarm, L. Payakapol, and A. Noisuwan. 2011. Effect of Cooking Methods on Physicochemical Properties of Brown Rice. *2<sup>nd</sup> International Conference on Environmental Science and Technology*, 6, 1-4.

- Danuri, H. 2008. Optimizing Angkak Pigments and Lovastatin Production by *Monascus purpureus*. *HAYATI Journal of Biosciences*, 15(2), 61-66.
- Dhale, M.A. 2007. Physiology of *Monascus purpureus* in Relation to Metabolite Production and Application as Functional Food, *Ph.D. thesis*, University of Mysore, India.
- Dikshit R. and P. Tallapragada. 2011. *Monascus purpureus*: A Potential Source for Natural Pigment Production. *Journal of Microbiology and Biotechnology Research*, 1(4): 164-174.
- Dufossé, L., P. Galaup, A. Yaron, S.M. Arad, P.J. Blanc, K.N.C. Murthy, and G.A. Ravishankar. 2005. Microorganism and Microalgae as Sources of Pigments for Food Use: A Scientific Oddity or An Industrial Reality. *Trends in Food Science and Technology*, 16, 389-406.
- Eisenbrand, G. 2006. Toxicological Evaluation of Red Mould Rice. *Molecular Nutrition and Food Research*, 50, 322-327.
- Fardiaz, S., 1989. *Petunjuk Laboratorium Analisa Mikrobiologi Pangan*. Bogor: Departemen Pendidikan dan Kebudayaan Direktorat Jendral Pendidikan Tinggi PAU Pangan dan Gizi IPB.
- Gbabo, A. S.M. Dauda, and J.C. Igbeka. 2009. Water Absorption Behavior of Milled Parboiled Rice in Relationship with Variety and Some Basic Thermodynamic Properties of Steam. *Assumption University Journal of Technology*, 13(2), 101-106.
- Hajjaj, H., A. Klaébé, M.O. Loret, T. Tzédakis, G.Goma, and P.J. Blanc. 1997. Production and Identification of *N*-Glucosylrubropunctamine and *N*-Glucosylmonascorubramine from *Monascus ruber* and Occurrence of Electron Donor-Acceptor Complexes in These Red Pigments. *Applied and Environmental Microbiology*, 63(7), 2671-2678.
- Hajjaj, H., P.J. Blanc, E. Groussac, G.Goma, J.L. Uribelarrea, and P. Loubiere. 1999. Improvement of Red Pigment/Citrinin Production Ratio as a Function of Environmental Conditions by *Monascus ruber*. *Biotechnology and Bioengineering*, 64(4), 497-501.

- Jirasatit, S. and A. Thongtha. 2005. Effect of Degree of Gelatinization of Rice on Growth and Pigment Production of *Monascus purpureus*. [http://www.agro.cmu.ac.th/department/fe/elearning/499DriedLongan/CD%20Propak/AGRO\\_8%20%28E%29/p5/P5\\_fullpaper/P5-02.pdf](http://www.agro.cmu.ac.th/department/fe/elearning/499DriedLongan/CD%20Propak/AGRO_8%20%28E%29/p5/P5_fullpaper/P5-02.pdf) (26 Februari 2012)
- Kasim, E., N. Suharna, N. Nurhidayat. 2006. Kandungan Pigmen dan Lovastatin pada Angkak Beras Merah Kultivar Bah Butong dan BP 1804 IF 9 yang Difermentasi dengan *Monascus purpureus* Jmba. *Biodiversitas*, 7(1), 7-9.
- Khush, G.S. 1997. Origin, Dispersal, Cultivation and Variation of Rice. *Plant Molecular Biology*, 35, 25-34.
- Lai, H.M. 2001. Effects of Hydrothermal Treatment on the Physicochemical Properties of Pregelatinized Rice Flour. *Food Chemistry*, 72, 455-463.
- Lee, B.K., N.H. Park, H.Y. Piao, and W.J. Chung. 2001. Production of Red Pigments by *Monascus purpureus* in Submerged Culture. *Biotechnology and Bioprocess Engineering*, 6, 341-346.
- Lii, C.Y., M.L. Tsai, and K.H. Tseng. 1996. Effect of Amylose Content on The Rheological Property of Rice Starch. *Cereal Chemistry*, 73(4), 415-420.
- Lin, W.Y., J.Y. Chang, C.H. Hsi, and T.M. Pan. 2007. Proteome Response of *Monascus pilosus* during Rice Starch Limitation with Suppression of Monascorubramine Production. *Journal of Agricultural Food Chemistry*, 55, 9226-9234.
- Lin, Y.L., Wang, T.H., Lee, M.H., and Su, N.W. 2008. Biologically Active Components and Nutraceuticals in The *Monascus*-Fermented Rice: A Review. *Applied Microbiology and Biotechnology*, 77, 965-973.
- Liu, Q. 2005. Understanding Starches and Their Role in Foods (dalam *Food Carbohydrates, Chemistry, Physical Properties, and Applications*, S.W. Cui, Ed.). USA: CRC Press
- Luh, B.S. 1980. *Rice: Production and Utilization*. Connecticut: Avi Publishing Company, Inc.

- Ministry of Science and Technology, Government of India. 2008. *Biology of Rice*. <http://dbtbiosafety.nic.in/guidelines/rice.pdf> (23 Maret 2012)
- Pattanagul, P., R. Pinthong, A. Phianmongkhol, and N. Leksawasdi. 2007. Review of Angkak Production (*Monascus purpureus*). *Chiang Mai Journal of Science*, 34(3), 319-328.
- Pereira, D.G., A. Tonso, and B.V. Kilikian. 2008. Effect of Dissolved Oxygen Concentration on Red pigment and Citrinin Production by *Monascus purpureus* ATCC 36928. *Brazilian Journal of Chemical Engineering*, 25(2), 247-253.
- Permana, D.R., S. Marzuki, dan D. Tisnadjaja. 2004. Analisis Kualitas Produk Fermentasi Beras (*Red Fermented Rice*) dengan *Monascus purpureus* 3090. *Biodiversitas*, 5(1), 7-12.
- Pomeranz, Y. and C. E. Meloan. 1994. *Food Analysis: Theory and Practice*, 3<sup>rd</sup> Ed. USA: Chapman & Hall.
- Prabowo, S. 2006. Pengolahan dan Pengaruhnya terhadap Sifat Fisik dan Kimia serta Kualitas Beras. *Jurnal Teknologi Pertanian*, 1(12), 43-49.
- Raimbault, M. 1998. General and Microbiological Aspects of Solid Substrate Fermentation. *Electronic Journal of Biotechnology*, 1(3), 1-15.
- Rao, M.K. and M.T. Jackson. 1996. Seeds Longevity of Rice Cultivars and Strategies for Their Conservation in Genebanks. *Annals of Botany*, 77, 251-26.
- Ristiarini, S., N. Kusumawati, dan I. Srianta. 2010. Isolasi *Monascus sp.* dari angkak yang beredar di Surabaya dan Studi Potensinya untuk Produksi Pigmen *Monascus*, *Laporan Penelitian*, Fakultas Teknologi Pertanian, Universitas Katolik Widya Mandala Surabaya.
- Said, F.M. 2010. *Monascus ruber* ICMP 15220 Fermentation for The Production of Pigments, *Ph.D. thesis*, Massey University, New Zealand.

- Said, F.M., Y. Chisti, and J. Brooks. 2010. The Effects of Forced Aeration and Initial Moisture Level on Red Pigment and Biomass Production by *Monascus ruber* in Packed Bed Solid State Fermentation. *International Journal of Environmental Science and Development*, 1(1), 1-4.
- Sudarmadji, S., B. Haryono, dan Suhardi. 1989. *Prosedur Analisa untuk Bahan Makanan dan Pertanian*. Yogyakarta: Liberty.
- Suprihatno, B., A.A. Daradjat, Satoto, Baehaki, I.N. Widiarta, A. Setyono, S.D. Indrasari, O.S. Lesmana, dan H. Sembiring. 2009. *Deskripsi Varietas Padi*. Subang: Balai Besar Penelitian Tanaman Padi
- Susanto, U. 2003. Perkembangan Varietas Unggul Padi Menjawab Tantangan Jaman. *Sinar Tani*. <http://pustaka.litbang.deptan.go.id/bppi/lengkap/st260203-1.pdf> (27 Maret 2012)
- Svihus, B., A.K. Uhlen, and O.M. Harstad. 2005. Effect of Starch Granule Structure, Associated Components and Processing on Nutritive Value of Cereal Starch: A Review. *Animal Feed Science and Technology*, 122, 303-320.
- Timotius, K.H. 2004. Produksi Pigmen Angkak oleh *Monascus*. *Jurnal Teknologi dan Industri Pangan*, 15(1), 79-86.
- Vanaja, T. and L.C. Babu. 2003. Association Between Physicochemical Characters and Cooking Qualities in High-Yielding Rice Varieties of Diverse Origin. *International Rice Research Notes*, 28(1), 28-29.
- Vandeputte, G.E., R. Vermeylen, E. Theunissen, M.H.J. Koch, J.A. Delcour, and H. Reynaers. 2001. *Structural Changes During Gelatinization and Retrogradation of Rice Starch Gels*. [http://hasyweb.desy.de/science/annual\\_reports/2000\\_report/part2/contrib/73/3802.pdf](http://hasyweb.desy.de/science/annual_reports/2000_report/part2/contrib/73/3802.pdf) (11 Mei 2012).
- Viccini, G., M. Mannich, D.M.F. Capalbo, R.V. Sanhueza, and D. A. Mitchell. 2007. Spore Production in Solid-state Fermentation of Rice by *Clonostachys rosea*, a Biopesticide for Gray Mold of Strawberries. *Process Biochemistry*, 42, 275-278.

Widjajaseputra, A.I., Harijono, Yunianta, dan T. Estianti. 2011. Pengaruh Rasio Tepung Beras dan Air terhadap Karakteristik Kulit Lumpia Basah. *Jurnal Teknologi dan Industri Pangan*, 22(2), 184-189.

Winarno, F.G. 1992. *Kimia Pangan*. Jakarta: Gramedia Pustaka Utama