

BAB V

KESIMPULAN DAN SARAN

5.1. Kesimpulan

1. Penggunaan konsentrasi bubuk daun beluntas-teh hitam dalam air seduhan memberikan pengaruh nyata terhadap total fenol, total flavonoid, kemampuan menangkal radikal bebas DPPH dan kemampuan mereduksi ion besi pada bakpao beluntas-teh hitam.
2. Semakin tinggi konsentrasi, semakin tinggi aktivitas antioksidan bakpao beluntas-teh hitam.
3. Senyawa fenol dan flavonoid yang terkandung di dalam bakpao beluntas-teh hitam memiliki aktivitas antioksidan primer dan sekunder.

5.2. Saran

Pada penelitian ini aktivitas antioksidan yang diamati hanya berasal dari senyawa fenol dan flavonoid. Oleh karena itu, masih perlu dilakukan penelitian lebih lanjut untuk mengetahui kemungkinan adanya senyawa-senyawa fitokimia lain yang memberikan aktivitas antioksidan pada bakpao.

DAFTAR PUSTAKA

- Agustiningih., A. Wildan, dan Mindaningsih. 2010. Optimasi Cairan Penyari pada Pembuatan Ekstrak Daun Pandan Wangi (*Pandanus amaryllifolius* Roxb) secara Maserasi terhadap Kadar Fenolik dan Flavonoid Total, *Momentum*. 6 (2): 36-41.
- Alfian, B. dan R. Susanti. 2012. *Analisis Senyawa Fenolik*. Semarang: Universitas Diponegoro Press. Hal. 43-65.
- Alrawaiq, N.S. and A. Abdullah. 2014. A Review of Flavonoid Quercetin: Metabolism, Bioactivity and Antioxidant Properties, *International Journal of PharmTech Research*. 6 (3): 933-941.
- Al-Temimi, A. and R. Choundhary. 2013. Determination of Antioxidant Activity In Different Kinds of Plants In Vivo and In Vitro By Using Diverse Technical Methods, *Journal Nutrition of Food Science*. 3 : 1-9.
- Ananto, D.S. 2012. *Bakpao*. Jakarta: Demedia Pustaka. Hal. 12-16.
- Andarwulan, N., R. Batari., D.A. Sandrasari., B. Bolling. and H. Wijaya. 2010. Short Communication Flavonoid Content and Antioxidant Activity of Vegetables from Indonesia, *Food Chemistry*. 121 : 1231–1235.
- Ardiansyah., L. Nuraida. dan N. Andarwulan. 2003. Aktivitas Antimikroba Daun Beluntas (*Pluchea indica* Less) dan Stabilitas Aktivasnya pada Berbagai Konsentrasi Garam dan Tingkat pH. *Jurnal Teknologi dan Industri Pangan (XIV)*. 14 (2): 90-97.
- Atanassova, M., S. Georgieva. and K. Ivancheva. 2011. Total Phenolic and Total Flavonoid Contents, Antioxidant Capacity and Biological Contaminants In Medicinal Herbs, *Journal of UCTM*. 46 (1): 81–88.
- Biswas, R., P.K. Dutta., B. Achari., D. Bandyopadhyay., M. Mirsha., K.C. Pramanik and T.K. Catherjee. 2005. Isolation, Purification and Characterization of Four Pure Compounds from the Root Extract of *Pluchea indica* Less and The Potentiality of The Root Extract and The Pure Compounds for Antimicrobial Activity, *European Bulletin of Drug Research*. 13 : 63-70.
- Budianta, T.D.W. dan S. Ristiarini. 2009. Penentuan Masa Kadaluausa Teh Hitam dan Teh Wangi dalam Kemasan Kertas Menggunakan Metode

- GAB (Guggenheim Anderson de Boer), *Laporan Hasil Penelitian*, Tandon Perpustakaan Unika Widya Mandala, Surabaya. Hal. 12-18.
- Burda, S., and W. Oleszek. 2001. Antioxidant and Antiradical Activities of Flavonoids, *Journal of Agricultural Food Chemistry*. 49: 2774-2779.
- Chakuton, K., D. Puangpropintag. and M. Nakornriab. 2012. Phytochemical Content and Antioxidant Activity of Colored and Non-Colored Thai Rice Cultivars, *Asian Journal of Plant Sciences*. 1 : 285-293.
- Chan, E.W.C., Y.Y. Lim and M. Omar. 2007. Antioxidant and Antibacterial Activity of Leaves of Etlingera Species (*Zingiberaceae*) in Peninsular Malaysia, *Food Chemistry*. 104 : 1586-1593.
- Dai, J. and R.J. Mumper. 2010. Plant Phenolics: Extraction, Analysis and Their Antioxidant and Anticancer properties, *Molecules*. 15 : 7313-7352.
- Dalimartha, S. 1999. *Atlas Tumbuhan Obat Indonesia*. Jakarta: Trubus Agriwidaya. Hal. 18-21.
- Dalimartha, S. dan M. Soedibyo. 1999. *Awet Muda Dengan Tumbuhan Obat dan Diet Supleme*. Jakarta: Trubus Agriwidaya. Hal. 36-40.
- Daly, L.E. and G.J. Bourke. 2000. *Interpretation and Uses of Medical Statistics*. Dallas: Wiley-Blackwell.
- Desmiaty, Y., H. Ratih., M.A. Dewi dan R. Agustin. 2008. Penentuan Jumlah Tanin Total pada Daun Jati Belanda (*Guazuma ulmifolia Lamk*) dan Daun Sambang Darah (*Excoecaria bicolor Hassk.*) Secara Kolorimetri dengan Pereaksi Biru Prusia, *Ortocarpus*. 8 : 106-109.
- Erol, N.T., F. Sari. and Y.S. Velioglu. 2010. Polyphenols, Alkaloids and Antioxidant Activity of Different Grades Turkish Black Tea, *GIDA*. 35 (3): 161-168.
- Farsigama. 2012. *Fitosterol, Kolesterol Baik*. <http://farsigama.farmasi.ugm.ac.id/fitosterol-kolesterol-baik/> (Diakses tanggal 12 Oktober 2017).
- Fu, L., B.T. Xu., R.Y. Gan., Y. Zhang., X.R. Xu., E.Q. Xia. and H.B. Li. 2011. Total Phenolic Contents and Antioxidant Capacities of Herbal and Tea Infusions, *International Journal of Molecular Sciences*. 12 : 2112-2124.

- Garba, S. and S.O. Okeniyi. 2012. Antimicrobial Activities of Total Alkaloids Extracted from Some Nigerian Medicinal Plants, *Journal of Microbiology and Antimicrobials*. 4 (3): 60-63.
- Haeria., Hermawati dan A.T. Ugi. 2016. Penentuan Kadar Flavonoid Total dan Aktivitas Antioksidan Ekstrak Etanol Daun Bidara (*Ziziphus spina-christi L.*), *Journal of Pharmaceutical and Medicinal Sciences*. 1 (2): 57-61.
- Handayani, H., F.H. Sriherfyna. dan Yunianta. 2016. Ekstraksi Antioksidan Daun Sirsak Metode *Ultrasonic Bath* (Kajian Rasio Bahan : Pelarut dan Lama Ekstraksi), *Jurnal Pangan dan Agroindustri*. 4 (1): 262-272.
- Handoko, H.B. 2009. *Peta 50 Tempat Makan Makanan Favorit di Malang*. Jakarta: PT. Gramedia Pustaka Utama. Hal. 15-16.
- Hanin, N.N.F. dan R. Pratiwi. 2017. Kandungan Fenolik, Flavonoid dan Aktivitas Antioksidan Ekstrak Daun Paku Laut (*Acrostichum aureum L.*) Fertil dan Steril, *Journal of Tropical Biodiversity and Biotechnology*. 2 : 51-56.
- Harborne, J.B. 1987. *Metode Fitokimia, Penuntun Cara Modern Menganalisis Tumbuhan. Edisi 4, terjemahan Kosasih P. dan Soediro L.* Bandung: ITB.
<https://books.google.co.id/books?id=BIMpBgAAQBAJ&printsec=frontcover&dq=Harborne,+J.+B.,+1987.+Metode+Fitokimia,+Penuntun+Cara+Modern+Menganalisis+Tumbuhan&hl=en&sa=X&ved=0ahUKEwiZ1uK7kLPXAhUFRo8KHVd4A1YQ6AEIJzAA#v=onepage&q&f=false> (Diakses 1 Oktober 2017).
- Harborne, J.B. 1996. *Metode Fitokimia: Penuntun Cara Modern Menganalisa Tumbuhan. Terbitan Kedua.* Bandung: Institut Teknologi Bandung. Hal. 123-129.
- Hardiana, R., Rudiyanayah, dan T.A. Zaharah. 2012. Aktivitas Antioksidan Senyawa Golongan Fenol dari Beberapa Jenis Tumbuhan Famili Malvaceae, *Jurnal Kimia dan Kemasan*. 1 (1): 8-13.
- Hartoyo, A. 2003. *Teh dan Khasiatnya Bagi Kesehatan, Sebuah Tinjauan Ilmiah*. Yogyakarta: Kanisius. Hal. 9 dan 11.
- Hawley, T.S. and R.G. Hawley. 2004. *Flow Cytometry Protocols*. New York: Humana Press, Inc. Page 89-90.
- Heldt, H.W. 2005. *Plant Biochemistry*. UK: Elsevier. Page 448-449.

- Horvathova, J., M. Suhaj. and P. Simko. 2007. Effect of Thermal Treatment and Storage on Antioxidant Activity of Some Spices, *Journal of Food and Nutrition Research*. 46 (1): 20-27.
- Hostettmann, K. and A. Marston. 1995. *Saponins – Chemistry and Pharmacology of Natural Products*. Cambridge: Cambridge University Press. Page 2.
- Huang, D., B. Ou. and R.L. Prior. 2005. The Chemistry Behind Antioxidant Capacity Assays, *Journal of Agricultural and Food Chemistry*. 53 (6): 1841-1856.
- Jeffrey, G.A. 1997. *An Introduction to Hydrogen Bonding*. England: Oxford University Press. Page 191. <https://sci-hub.tw/10.1021/ja9756331> (Diakses 25 Juli 2018).
- Kedare, S.B. and R.P. Singh. 2011. Genesis and Development of DPPH Method of Antioxidant Assay, *Journal of Food Science and Technology*. 48 (4): 412-422.
- Lade, B.D., A.S. Patil., H.M. Paikrao., A.S. Kale. and K.K. Hire. 2014. A Comprehensive Working, Principles and Applications of Thin Layer Chromatography, *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 5 (4): 486-503.
- Lai, P., K.Y. Li., S. Lu dan H.H. Chen. 2009. Analytical Methods Phytochemicals and Antioxidant properties of solvent extracts from Japonica rice bran, *Food Chemistry*. 117 : 538–544.
- Leong, L.P. and G. Shui. 2002. An Investigation of Antioxidant Capacity of Fruits in Singapore Markets, *Food Chemistry*. 76 : 69–75.
- Liaqid, A., M. Palma., J. Brigui. and C.G. Barroso. 2007. Investigation on Phenolic Compounds Stability During Microwave-assisted Extraction, *Journal of Chromatography A*. 1140 : 29–34.
- Luger, P.W., M. Dung, P.H.N.X. Ngoc., D.T. Tuong and D.D. Rang. 2000. The Crystal Structure of Hop17(21)-en-3 β -yl Asetat of Pluchea pteropoda Hemsl. from Vietnam, *Crystal Res Technology*. 35 (3): 355-362.
- Magalhaes, L.M., M.A. Segundo., S. Reis., and J.C. Lima. 2008. Methodological Aspects about in vitro Evaluation of Antioxidant Properties, *Analytica Chimica Acta*. 613 : 1-19.

- McDonald, S., P.D. Prenzler., M. Antolovich. and K. Robards. 2001. Phenolic Content and Antioxidant Activity of Olive Extracts, *Food Chemistry*. 73 : 73-84.
- Molyneux, P. 2004. The Use of Stable Free Radical diphenylpicrylhydrazyl (DPPH) for Estimating Antioxidant Activity, *Songklanakarin Journal Science Technology*. 26 (2): 211-219.
- Otohinoyi, D.A., O. Ekpo. and O. Ibraheem. 2014. Effect of Ambient Temperature Storage on 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) as a Free Radical for The Evaluation of Antioxidant Activity, *International Journal of Biological and Chemical Sciences*. 8 (3): 1262-1268.
- Pakaroti. 2017. *Material Encyclopedia*. <http://pakaroti.com/material/air-es> (Diakses 17 Oktober 2017).
- Park, Y.S., S.J. Kim and H.I. Chang. 2008. Isolation of Anthocyanins from Black Rice (Heuginjubyeo) and Screening of Its Antioxidant Activities, *Journal of Microbial Biotechnology*. 36 (1): 55-60.
- Parmar, S.K., T.P. Sharma., V.B. Airao., R. Bhatt., R. Aghara., S. Chavda., S.O. Rabadiya. And A.P. Gangwal. 2013. Neuropharmacological Effects of Triterpenoids, *Phytopharmacology*. 4 (2): 354-372.
- Prakash, A., F. Rigelhof and E. Miller. 2007. *Antioxidant Activity*. Serial online, http://www.medallionlabs.com/Dow_nloads/Antiox_acti_.pdf (Diakses tanggal 12 Oktober 2017).
- Prangdimurti, E. dan A.R. Julian. 2013. Inhibisi Alfa-Amilase dan Alfa-Glukosidase Teh Hijau Dipengaruhi Oleh Cara Penyeduhan dan Proses Pencernaan, *Prosiding Seminar Nasional PATPI*. ISBN: 978-602-9030-49-5.
- Rakic, S., R. Malectic., M. Perunovic. and G. Svrzic. 2004. Influence of Thermal Treatment on Tannin Content and Antioxidant Effect of Oak Acorn Quercus Cerris Extract, *Journal of Agricultural Sciences*. 49 (1): 97-107.
- Rasyad, R. 2003. *Metode Statistik Deskriptif*. Jakarta: PT. Grasindo. Hal. 113.
- Robinson, T. 1995. *Kandungan Organik Tumbuhan Tinggi. Edisi ke-4 Terjemahan Kosasih Padmawinata*. Bandung: ITB Press. <https://books.google.co.id/books?id=RqYyDwAAQBAJ&pg=PA27&dq=kandungan+organik+tumbuhan+tinggi+kosasih+padmawinata>

https://www.researchgate.net/publication/249075135_Phytosterol_Oxidation_Products_Their_Formation_Occurrence_and_Biological_Effects (Diakses 17 Oktober 2017).

- Ryan, E., F.O. Mccarthy., A.R. Maguire. and N.M. Obrien. 2009. Phytosterol Oxidation Products: Their Formation, Occurrence, and Biological, *Food Reviews International*. 25 (2): 157-174. https://www.researchgate.net/publication/249075135_Phytosterol_Oxidation_Products_Their_Formation_Occurrence_and_Biological_Effects
- Saifudin, A., R. Viesa., dan Y.T. Hilwan. 2011. *Standarisasi Bahan Obat Alam*. Yogyakarta: Graha Ilmu. Hal. 70.
- Sari, B.L., N. Susanti. dan Sutanto. 2015. Skrining Fitokimia dan Aktivitas Antioksidan Fraksi Etanol Alga Merah *Eucheuma spinosum.*, *Journal of Scientific Research in Pharmacy ISSN*. 2 (1): 2407-2354.
- Saxena, M., J. Saxena. and A. Pradhan. 2012. Flavonoid and Phenolic Acids as Antioxidants in Plants and Human Health, *International Journal Pharmaceutical Sciences Review and Research*. 16 (2): 130-134.
- Sayuti, K. dan R. Yenrina. 2015. *Antioksidan Alami dan Sintetik*. Padang: Andalas University Press. Online Book. http://webcache.googleusercontent.com/search?q=cache:http://repository.unand.ac.id/23714/1/Kesuma%2520Sayuti_Antioksidan%2520Alami%2520dan%2520Sintetik%2520OK.pdf (Diakses 18 Oktober 2017).
- Sayuti, M. 2017. Pengaruh Perbedaan Metode Ekstraksi, Bagian dan Jenis Pelarut Terhadap Rendemen dan Aktivitas Antioksidan Bambu Laut (*Isis Hippuris*), *Technology Science and Engineering Journal*. 1 (3): 166-174.
- Shahidi, F. (ed) *Natural Antioxidants*. Illinois: AOCS Press Champaign. Page 12-24.
- Somantri, R. dan K. Tanti. 2011. *Kisah dan Khasiat Teh*. Jakarta: PT. Gramedia Pustaka Utama. Hal. 21-32.
- Sompong, 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 :132-140.

- Stanojevic, L., M. Stankovic., V. Nikolic., L. Nikolic., D. Ristic., and J.C. Brunet. 2009. Antioxidant Activity, Total Phenolic and Flavonoid Content of *Hieracium picosella* L. Extract, *Journal Sensors (Basel)*. 9 (7): 5702-5714.
- Suryaningrum, D., T. Wikanta. dan H. Kristiana. 2006. Uji Senyawa Antioksidan dari Rumput Laut *Halymenia harveyana* dan *Euchema cottonii*, *Pascapanen dan Bioteknologi Kelautan dan Perikanan*. 1 (1): 51-63.
- Tengo, N.A., N. Bialangi dan N. Suleman. 2017. Isolasi dan Karakterisasi Senyawa Alkaloid dari Daun Alpukat (*Persea Americana mill*), *Jurnal Pendidikan Kimia Fakultas MIPA*. 1 : 1-12.
- Tim Kreatif Readboy. 2016. *Re-Bread Sehat dan Enak*. Jakarta: PT. Readboy Indonesia. Hal. 4-5.
- Tiong, S.H., C.Y. Looi., H. Hazni, A. Arya, M. Paydar, and W.F. Wong. 2013. Antidiabetic and Antioxidant Properties of Alkaloids From *Catharantus roseus* (L.) G. Don, *Molecules*. 18 : 9770-9784.
- Thompson, E.B. 1985. *Drug Bioscreening*. America: Graceway Publishing Company. Page 40.
- Tranggono. 1990. *Bahan Tambahan Pangan (Food Additive)*. Yogyakarta: Pusat Antar Universitas Pangan dan Gizi UGM. Hal. 6.
- Veljkovic, J.N., A.N. Pavlovic., S.S. Mitic., S.B. Tosic., G.S. Stojanovic., B.M. Kalicanin., D.M. Stankovic., M.B. Stojkovic., M.N. Mitic. and J.M. Bracanovic. 2013. Evaluation of Individual Phenolic Compounds and Antioxidant Properties of Black, Green, Herbal and Fruit Tea Infusions Consumed in Serbia: Spectrophotometrical and Electrochemical Approaches, *Journal of Food and Nutrition Research*. 52 (1): 12-24.
- Vermerris, W. and R. Nicholson. 2009. *Phenolic Compound Biochemistry*. USA: Springer. Page 1-3.
- Waghorn, G.C. and W.C. McNabb. 2003. Consequences of Plant Phenolic Compounds for Productivity and Health of Ruminants, *The Proceedings of The Nutrition Society*. 62 : 383-392.
- Westendarp, H. 2006. Effects of Tannis in Animal Nutrition, *Deutsche Tierarztliche Wochenschrift*. 113 : 264-268.
- Widyawati, P.S. 2009. Kajian penggunaan Ekstrak Beluntas (*Pluchea indica* Less) sebagai Antioksidan dalam Mencegah Warmed Over

Flavor (WOF) Daging Itik selama Penyimpanan, *Laporan Penelitian Hibah Bersaing*, Fakultas Teknologi Pertanian Unika Widya Mandala, Surabaya.

<http://lontar.ui.ac.id/opac/themes/libri2/detail.jsp?id=133550&lokasi=lokal> (Diakses 17 Oktober 2017).

- Widyawati, P.S., C.H. Wijaya., P.S. Harjosworo dan D. Sajuthi. 2010. Pengaruh Ekstraksi dan Fraksinasi terhadap Aktivitas Antioksidatif Daun Beluntas (*Pluchea indica* Less), *Jurnal Agroteknologi*. 4 (2): 183-193.
- Widyawati, P.S. 2011. Seleksi Daun Beluntas (*Pluchea indica* Less) sebagai Sumber Antioksidan Alami, *Laporan Penelitian*, Fakultas Pertanian IPB, Bogor.
http://repository.ipb.ac.id/jspui/bitstream/123456789/52890/1/2011p_sw.pdf (Diakses 17 Oktober 2017).
- Widyawati, P.S., C.H. Wijaya., P.S. Harjosworo dan D. Sajuthi. 2011. Evaluasi Aktivitas Antioksidatif Ekstrak Daun Beluntas (*Pluchea indica* Less) berdasarkan Perbedaan Ruas Daun, *Rekapangan Jurnal Teknologi Pangan*. 5 (1): 1-17.
- Widyawati, P.S., C.H. Wijaya., P.S. Harjosworo dan D. Sajuthi. 2012. Aktivitas Antioksidan berbagai Fraksi dan Ekstrak Metanolik Daun Beluntas (*Pluchea indica* Less), *Agritech*. 32 (3): 249-257.
- Widyawati, P.S., T.D.W. Budianta., F.A. Kusuma and E.L. Wijaya. 2014. Difference of Solvent Polarity to Phytochemical Content and Antioxidant Activity of *Pluchea indica* Less Leaves Extracts, *International Journal of Pharmacognosy and Phytochemical Research*. 6 (4): 850-855.
- Widyawati, P.S., T.D.W. Budianta., D.I. Gunawan and R.S. Wongso. 2015. Evaluation Antidiabetic Activity of Various Leaf Extracts of *Pluchea indica* Less, *International Journal of Pharmacognosy and Phytochemical Research*. 7 (3): 597-603.
- Widyawati, P.S., T.D.W. Budianta., A.R. Utomo and I. Harianto. 2016. The Physicochemical and Antioxidant Properties of *Pluchea indica* Less Drink in Tea Bag Packaging, *International Journal of Food and Nutrition Science*. 5 (3): 113-120.
- Widyawati, P.S., T.D.W. Budianta., Y.D.W. Werdani. dan M.O. Halim. 2018. Aktivitas Antioksidan Minuman Daun Beluntas Teh Hitam

- (*Pluchea indica* Less-*Camelia sinensis*), *AGRITECH*. 38 (2): 200-207.
- Wink, M. 2008. *Modern Alkaloids, Structure, Isolation Synthesis and Biology*. Jerman: Wiley-VCH Verlag GmbH & Co. KgaA. Page 3-4.
- Wulandari, T.A. 2017. Pengaruh Penambahan Air Perasan Lemon Terhadap Aktivitas Antidiabetik Minuman Beluntas (*Pluchea indica* Less) Lemon, *Skripsi S-1*, Fakultas Teknologi Pertanian Unika Widya Mandala, Surabaya. Hal. 37. <http://repository.wima.ac.id/11816/> (Diakses 15 Juli 2018).
- Yamaguchi, T., H. Takamura., T. Matoba and J. Terao. 1998. HPLC Method for Evaluation of The Free Radical-Scavenging Activity of Foods by Using 1,1,-diphenyl-2-picrylhydrazyl, *Bioscience Biotechnology Biochemistry*. 62 : 1201-1204.
- Yu, L. 2008. *Wheat Antioxidants*. USA: John Wiley and Sons, Inc. Page 31.
- Zhang, Y.J., R.Y. Gan., S. Li., Y. Zhou., A.N Li., D.P. Xu., and H.B. Li. 2015. Antioxidant Phytochemicals for The Prevention and Treatment of Chronic Diseases, *Molecules*. 20 : 21138-21156.
- Zou, Y., Y. Lu., and D. Wei. 2004. Antioxidant Activity of Flavonoid Rich Extrate of *Hypericum perforatum* L In Vitro, *Journal of Agricultural and Food Chemistry*. 52 : 5032-5039.