

**PENGARUH FORTIFIKAN MOLASE ANGGUR, MURBEI DAN CAROB
TERHADAP KANDUNGAN MINERAL BESI, TEMBAGA, SENG, MANGAN
DAN KALIUM PADA YOGHURT**

SKRIPSI

diajukan untuk memenuhi sebagian dari syarat untuk memperoleh gelar Sarjana Sains
Program Studi Kimia



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ABSTRAK

Yoghurt adalah produk susu yang banyak dikonsumsi dan dianggap sebagai minuman kesehatan. Yoghurt memiliki kandungan mineral zat besi dan seng yang rendah sehingga perlu dilakukan fortifikasi menggunakan berbagai sumber mineral. Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan sumber mineral yang berbeda dalam bentuk molase dengan rasio penambahan 6%, 10% dan 14% terhadap kandungan mineral dalam produksi yoghurt. Sumber fortifikan yang digunakan yaitu molase anggur, molase murbei dan molase carob. Metode yang digunakan dalam penelitian ini yaitu metode studi literatur dengan model *narrative review* untuk mengkaji jurnal rujukan terkait pengaruh fortifikasi sumber mineral alami terhadap kandungan mineral yoghurt terfortifikasi. Analisis kandungan mineral yoghurt terfortifikasi dalam penelitian ini menggunakan metode *Atomic Absorption Spectroscopy* (AAS). Hasil *review* dari jurnal dalam penelitian ini yaitu penambahan persentase fortifikan berpengaruh secara signifikan terhadap kandungan mineral yoghurt terfortifikasi dimana kandungan zat besi (Fe), tembaga (Cu), seng (Zn), mangan (Mn) maupun kalium kalium (K) pada yoghurt terfortifikasi meningkat seiring dengan meningkatnya jumlah fortifikan yang ditambahkan, yoghurt terfortifikasi 14% molase memiliki kandungan mineral paling besar diikuti oleh penambahan fortifikan dengan rasio 10% dan 6%. Perbedaan sumber fortifikan juga dapat menyebabkan perbedaan kandungan mineral zat besi (Fe), tembaga (Cu), seng (Zn), mangan (Mn) dan kalium kalium (K) pada yoghurt terfortifikasi.

Kata Kunci : mineral, sumber fortifikan, yoghurt

ABSTRACT

Yogurt is a dairy product that is widely consumed and served as a health drink. Yogurt has low iron and zinc mineral content, so it needs to be fortified using various mineral sources. This study aims to determine the effect of using different mineral sources in the form of molasses with an addition ratio of 6%, 10% and 14% to the mineral content in yogurt production. The sources of fortification used were grape molasses, mulberry molasses and carob molasses. The method used in this study is the literature study method with a narrative review model to study reference journals related to the effect of fortification of natural mineral sources on the mineral content of fortified yogurt. Analysis of the mineral content of fortified yogurt in this study using the Atomic Absorption Spectroscopy (AAS) method. The results of the review from the journals in this study were the addition of the fortification percentage had a significant effect on the mineral content of fortified yogurt where the iron (Fe), copper (Cu), zinc (Zn), manganese (Mn) and potassium (K) content in fortified yogurt increased with the increase in the amount of fortificant added, fortified yogurt 14% molasses had the largest mineral content followed by addition of fortification with a ratio of 10% and 6%. Different sources of fortification can also cause differences in the mineral content of iron (Fe), copper (Cu), zinc (Zn), manganese (Mn) and potassium potassium (K) in fortified yogurt.

Keywords: fortificant source, mineral, yoghurt

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DAFTAR PUSTAKA

- Abunada, S. J. (2013). *Nutritional assesment of Zn among adolescents in the Gaza Strip-Palestine*. . Open Journal of Epidemiology, 105-110.
- Adedayo BC, Oboh G, Akindahunsi AA. (2010). *Changes in the total phenol content and antioxidant properties of pepperfruit (Dennetia tripetala) with ripening*. Afr J Fd Sci 4(6): 403-409.
- Akbulut, M., Özcan, M.M., & Çoklar, H., (2009). *Evaluation of antioxidant activity, phenolic, mineral contents and some physicochemical properties of several pine honeys collected from Western Anatolia*. International Journal of Food Sciences and Nutrition 60, 7 577–589.
- Akbulut, S., Bayramoglu, M.M. (2013). *The trade and use of some medical and aromatic herbs in turkey*, *Studies On Ethno-Medicine*, 7(2): 67-77.
- Almatsier S. (2004). *Prinsip dasar ilmu gizi*. Jakarta: Gramedia Pustaka Utama
- Almatsier S. (2006). *Prinsip dasar ilmu gizi*. Jakarta: Gramedia Pustaka Utama
- Almatsier S. (2009). *Prinsip dasar ilmu gizi*. Jakarta: Gramedia Pustaka Utama
- Alasalvar C, Al-Farsi M and Shahidi F (2005) *Compositional characteristics and antioxidant components of cherry laurel varieties and pekmez*. Journal of Food Science 70 7–52.
- Arici M, Gumus T and Kara F (2004) *The fate of ochratoxin a during the Pekmez production from mouldy grapes*. Food Control 15 597–600.
- Arora S, Shree S, Gupta C. (2014). *Fortification of Milk and Milk Product for Value Addition*. Dairy Year Book.p.105-109
- Arslan E, Yener M E and Esin A (2005) *Rheological characterization of tahin/pekmez (sesame paste/ concentrated grape juice) blends*. Journal of Food Engineering 69 167–172
- Basu, A., Nguyen, A., Betts, N. M., & Lyons, T. J. (2014). *Strawberry As a Functional Food*. Critical Reviews in Food Science and Nutrition .
- Batu A (2005) *Production of liquid and white solid pekmez in Turkey*. Journal of Food Quality 28 417–427.

- Bogdan & Biklen, 2007. *Qualitative Data Analysis : A Sourcebook of New Methods*. California : Sage
- Brown, K.H. 1998. *Effect of Infection on Plasma Zinc Concentration and Implications for Zinc Status Assesment in Low Income countries*. Am J Clin Nutr. ; 68 (Suppl) : 425S -9S
- BSN, Badan Standarisasi Nasional. (2009). *Syarat Mutu Yogurt SNI 2981-2009*.
- BSN, Badan Standarisasi Nasional. (2004). *Air dan Air Limbah-Cara Uji Tembaga (Cu) dengan Metode Spectrofotometri Serapan Atom (SSA)-Nyala*. SNI 06-6989-6-2004, Serpong : BSN
- Bulut, Y. (2006). *Useful Plants of Manavgat District (Antalya)*, Master Thesis, Süleyman Demirel University, Isparta, Turkey.
- Campos, M.R., N.C. Solis, G.R. Rubio, L.C. Guerrero, dan D.B. Ancona. (2014). *Chemical and Functional Properties of Chia Seed (Salvia hispanica L.) Gum*. Mexico. ,International Journal of Food Science. Vol. 2014. Article ID 241053.
- Celik A, Ercilsı S and Turgut N (2007). *Some physical, pomological and nutritional properties of kiwi marmalade fruit cv. Hayward*. International Journal of Food Sciences & Nutrition 58 411–418.
- Chotimah, S. C. (2009). *Peranan Streptococcus thermophilus dan Lactobacillus bulgaricus dalam proses pembuatan yogurt*. J. Ilmu Peternakan 4 (2) : 47-52.
- Connel dan Miller, (1995). *Kimia dan Etoksikologi Pencemaran*, diterjemahkan oleh Koestoer, S., hal. 419, Indonesia University Press, Jakarta
- Craig, R. (2004). *Application for approval of whole chia (Salvia hispanica L.) seed and ground whole seed as novel food ingredient*. Northern Ireeland Company Representative. Mr D Amstrong.
- Cronquist, A., (1981). *An Integrated System of Classification of Flowering Plants*, New York, Columbia University Press, 477.
- Dakia, P.A. (2011). *Nuts and seeds in health and disease prevention, carob (ceratonia siliqua l.) seeds, endosperm and germ composition, and application to health*, Abstract, 293-299.

- Demirozu B, Sokmen M, Uçak A, Yılmaz H and Gu'lderen S, (2002) *Variation of copper, iron, and zinc levels in pekmez products*. Bulletin of Environmental Contamination and Toxicology 69 330–334.
- Departemen Kesehatan R.I. (2001). *Program Penanggulangan Anemia Gizi pada Wanita Usia Subur (WUS)*; (Safe Motherhood Project: A Partnership and Family Approach). Direktorat Gizi Masyarakat. Jakarta: Direktorat Jenderal Bina Kesehatan Masyarakat Depkes,
- Direktorat Bina Gizi, Kemenkes RI. (2014). *Pedoman Gizi Seimbang*. Jakarta: Direktorat Bina Gizi.
- El Batal, H., Hasib, A., Ouatmane, A., Dehbi, F., Jaouad, A., Boulli, A. (2016). *Sugar composition and yield of syrup production from the pulp of moroccan carob pods (ceratonia siliqua L.)*, *Arabian Journal of Chemistry*, 9: 955-959.
- Garcia, R., dan Baez A. P. (2012). *Atomic Absorption Spectrometry (AAS)*. Intech : Rijeka
- Gibson, R. S. (2005). *Principles of Nutritional Assessment. Second Edition*. Oxford University Press Inc, New York.
- Gropper SS, Smith JL, Groff JL. (2009). *Advanced Nutrition And Human Metabolism. 5 ed*. Wadsworth (USA): 488-497.
- Güneş, S. and Karaisalı (adana), (2010). *villages natural plants used by the public ethnobotanical respect investigation*, Master Thesis, Niğde University, Niğde, Turkey.
- Gürdal, B. (2010) *Ethnobotanical study in marmaris district (muğla)*, Master Thesis, İstanbul University, İstanbul, Turkey.
- Helmyati, S., Yuliati, E., Pamungkas, N. P., dan Hendarta, N. Y. (2018). *Fortifikasi Pangan Berbasis Sumberdaya Nusantara*. Yogyakarta: Gadjah Mada University Press.
- Hummer K.E., Bassil N., Njuguna W. (2011). *Fragaria*. <http://www.springer.com/978-3-642-16056-1>. February 23rd, 2012.

- Ihemeje A, Nwachukwu CN and CC Ekwe (2015). *Production and quality evaluation of flavoured yoghurts using carrot , pineapple, and spiced yoghurts using ginger and pepper fruit Afri. J. Food Sci.* 2015; 9:163–169.
- Indrasari, A. dan A. Syukur. 2006. *Pengaruh Pemberian Pupuk Kandang dan Unsur Hara Mikro Terhadap Pertumbuhan Jagung Pada Ultisol yang Dikapur.* Jurnal Ilmu Tanah dan Lingkungan 6(2):116-238.
- Irawan, MA. (2007). *Cairan Tubuh, Elektrolit dan Mineral.* Polton Sport Science and Performance Lab.
- Islam A (2002). *'Kiraz' cherry laurel.* New Zealand Journal of Crop and Horticultural Science 30 301–302.
- Kalkwarf, et al (2003). *Milk Intake During Childhood and Adolescence, Adult Bone Density, and Osteoporotic Fractures in US Women.* American Journal Clinical Nutrition. 77, 257-265.
- Kalyoncu I H, Ersoy N, Elidemir A Y and Dolek C (2013). *Mineral and some physico-chemical composition of 'karayemis' (Prunus laurocerasus L.) fruits grown in Northeast Turkey.* World Academy of Science, Engineering and Technology International Journal of Biological, Veterinary, Agricultural and Food Engineering 7 176–179.
- Karababa E and Is, ıklı N D (2005) *Pekmez: a traditional concentrated fruit product.* Food Reviews International 21 357–366.
- Karaca O. B, Ibrahim B. S, Mehmet G. (2012). *Physicochemical, mineral, and sensory properties of set-type yoghurts produced by addition of grape, mulberry and carob molasses (Pekmez) at different ratios.* International Journal of Dairy Product
- Karkacier, M., Artik, N. (1995). *Physical properties, chemical composition and extraction conditions of carob bean (ceratonia siliqua L.), Food,* 20(3): 131-136.
- Kementrian Kesehatan RI. (2018). *Riset Kesehatan Dasar.* Jakarta: Kemenkes RI.
- Khomsan Ali. (2004). *Pangan dan Gizi untuk Kesehatan.* Jakarta: PT Raja Grafindo Persada.

- Kibui et al., (2018). *Proximate Composition and Nutritional Characterization of Chia Enriched Yoghurt*. Afr. J. Food Agric. Nutr. Dev. 18(1): 13239-13253
- Kurniawati N. (2010). *Sehat dan Cantik Alami Berkat Khasiat Bumbu Dapur*. Qanita, Penerbit Qanita, Bandung, Hal.146.
- Legowo, A. M., S. Mulyani dan Kusrahayu. (2009). *Teknologi Pengolahan Susu*. Semarang : Universitas Diponegoro.
- Liyana-Pathirana C M, Shahidi F and Alasalvar C (2006). *Antioxidant activity of cherry laurel fruit (Laurocerasus officinalis Roem.) and its concentrated juice*. Food Chemistry 99 121–128.
- Lukman, D.W., Sudarwanto, M., Sanjaya, A. W., Purnawarman, T., Latif, H dan Soejoedono, R. R. (2009). *Pemerahan dan Penanganan*. Fakultas Kedokteran Hewan. Institut Pertanian Bogor, Bogor.
- Makmun, C. (2007). *Wortel komoditas ekspor yang gampang dibudidayakan*. Hortikultura: 32.
- Malasari. (2005). *Sifat Fisik dan Organoleptik nugget ayam dengan penambahan wortel (Daucus carota L.)* Skripsi. Fakultas Peternakan. Institut Pertanian Bogor.
- Maria Ingrid dan Herry Santoso (2014). *Ekstraksi Antioksidan dan Senyawa Aktif dari Buah Kiwi (actinidia Deliciosa)*. Lembaga Penelitian dan Pengabdian kepada Masyarakat Universitas Katolik Parahyangan.
- Martianto. (2005). *Hubungan Pola Asuh Makan dan Kesehatan dengan Status Gizi Anak Batita di Desa Mulya Harja*. Jurnal Media Gizi Edisi : Desember 2005. 29 (2); 29-39
- Moleong Lexy. J. (2000). *Metodologi Penelitian Kualitatif*, Bandung : PT Remaja Rosdakarya.
- Nasution, AH., dan Darwin K. (1998). *Pengetahuan Gizi Muthakir Mineral*. PT. Gramedia. Jakarta
- Nurchahyo, Eko., (1999). *Anggur dalam Pot*, Jakarta : Penebar Swadaya.
- Okwu DE, Morah FNI (2004). *Mineral and Nutritive Value of Dennettia tripetala fruits*. Fruits 59:437-442

- Oliveira Ana, Domingos P.F. Ameida dan Manuela Pintado. (2014). *Change in Phenolic Compounds During Storage of Pasterized Strawberry*. Food and Bioprocess Technology 7, 1840-1846
- Omoregie dan Augustine. (2015). *Major Compound from the Essential Oil of the Fruit and Comparative Phytochemical Studies of the Fruits and Leaves of Dennettia tripetala Barker F. Found in North Central Nigeria*. International Journal of Pharmacognosy and Phytochemical Research. 7(6) : 1262-1266
- Oyemitan IA, Iwalewa EO, Akanmu MA, Asa SO, Olugbade TA (2006). *The Abusive Potential of Habitual Consumption of the Fruits of Dennettia tripetala G.Baker (Annonaceae) Among the People in Ondo Township (Nigeria)*. Nig J Natural Products Med. ;10:55–62.
- Ozcan M, Derya A., Harun G. (2007). *Some compositional properties and mineral contents of carob (Ceratonia siliqua) fruit, flour and syrup*. International Journal of Food Science and Nutrition 58 (8) : 652-658.
- Petry N, Olofin I, Boy E, Angel MD, Rohner F. (2016). *The Effect of Low Dose Iron and Zinc Intake on Child Micronutrient Status and Development during the First 1000 Days of Life: A Systematic and Meta-Analysis*. Nutrients, 8, 773.
- Poedjiadi, Anna dan F.M Titin Supriyanti. (2000). *Dasar-Dasar Biokimia*. Jakarta: UI Press
- Poedjiadi, Anna dan F.M Titin Supriyanti. (2005). *Dasar-Dasar Biokimia*. Jakarta: UI Press
- Priyanto, G. (1988). *Teknik Pengawetan Pangan*. Yogyakarta : Pusat Antar
- Raimon. (1993). *Perbandingan Metode Destruksi Basah dan Destruksi Kering secara Spektrofotometri Serapan Atom*. 79-87.
- Rochman, F. (2001). *Service & Maintenance Instrumental Kimia*. Makalah disajikan dalam Workshop. FMIPA Universitas Airlangga Surabaya.
- Rukmana R, (2000). *Usaha Tani Jahe Dilengkapi dengan pengolahan jahe segar, Seri Budi Daya*. Penerbit Kanisius, Yogyakarta.
- Rusdiana. (2016). *Bahan Ajar Gizi Metabolisme Mineral*. Semarang: Poltekes

- Sari, R. N. (2002). *Analisis Keragaman Morfologis dan Kualitas Buah Nenas (Ananas comosus (L.) Merr) Queen di Empat Desa Kabupaten Bogor*. Skripsi. Fakultas Pertanian. Institut Pertanian Bogor
- Sanchez-Segarra P J, Garcia-Martinez M, Gordillo-Otero M J, Diaz-Valverde A, Amaro-Lopez M A and Moreno-Rojas R (2000). *Influence of the addition of fruit on the mineral content of yoghurts: nutritional assessment*. Food Chemistry 70 85–89.
- Setiadi, (2005), *Bertanam Anggur*, Jakarta : Penebar Swadaya.
- Suprayogo, Imam. (2001). *Metodologi Penelitian Sosial Agama*. Bandung : Remaja Rosdakarya.
- Sekaran, Uma. (2011). *Research Methods For Business (Metode Penelitian Untuk Bisnis)*. Jakarta: Salemba Empat.
- Sengul M, Ertugay M F and Sengul M (2005). *Rheological, physical and chemical characteristics of mulberry pekmez*. Food Control 16 73–76.
- Simsek A and Artik N (2002). *Degisik meyvelerden uretilen pekmezlerin bilesim unsurlari uzerine arastirma*. Gıda, 27 459–467.
- Siagian, Albiner. (2003). *Pendekatan Fortifikasi Pangan Untuk Mengatasi Masalah Kekurangan Zat Gizimikro*. Sumatra Utara : USU Digital Lybrary.
- Silva, R.R.R., Araujo, A.C., Oliveira, J.F. (2008). *Frother assisted amine flotation of iron ores*. In: II International Symposium on Iron Ore, ABM, pp. 344–355.
- Skoog. D. A., Donald M. West, F. James Holler, Stanley R. Crouch, (2000). *Fundamentals of Analytical Chemistry*. Hardcover: 992 pages, Publisher: Brooks Cole
- Slamet, J. S. (2007). *Kesehatan Lingkungan*. Yogyakarta: Gadjah Mada University Press.
- Soedarya, A. P. (2009). *Budidaya Usaha Pengolahan Agribisnis Nanas*. Pustaka Grafika. Bandung. 129 hal
- Suranto A. (2004). *Khasiat & Manfaat Madu Herbal*. Penerbit Agromedia Pustaka, Tangerang.
- Sunardi, (2006). *Unsur Kimia*. Jakarta : Yrama Widya.

- Sunarjono, H. (2010). *Berkebun 21 Jenis Tanaman Buah*. Penebar Swadaya. Jakarta
- Tamime, A.Y. and R.K. Robinson. (2007). *Tamime and Robinson's Yoghurt : science and technology*. Elsevier
- Temiz Hasan, Zekai Tarakci, Tarik Yarilaga, dan Besir Dag. (2017). *Some physicochemical properties and mineral contents of stired yoghurts containing different fruit marmalades*. International Journal of Dairy Product
- Tetik, N., Turhan, İ., Karhan, M., Öziyici, H.R. (2010) *Characterization of, and 5-hydroxymethylfurfural concentration in carob pekmez, Food, 35 (6): 417-422.*
- Tosun I and Ustun N S (2003). *Nonenzymic browning during storage of white hard grape pekmez (Zile pekmezi)*. Food Chemistry 80 441–443.
- Tounsi Leila, Hela Kchaou, Firas Chaker, Sonda Bredai dan Nabil Kechaou. (2019). *Effect of adding carob molasses on physical and nutritional quality parameters of sesame paste*. J. Food Sci Technol. 56(3) : 1502-1509
- Trisunaryanti et al, (2002). *Study of Matrix Effect on The Analysis of Ni ana Pb by AAS In The Destruats of Hydrocracking Catalysts Using Aqua Regia and H₂SO₄*. Indonesian Journal of Chemistry, 2(3), 177-185
- Turhan İ., Tetik, N., Karhan, M. (2007). *Composition and production stages of carob pekmez*. *Electronic Journal of Food Technologies*, 2: 39-44.
- United State Departement of Agriculture. (2007). *Nutrient Database for Standard Reference*. RI.
- United States Departement of Agriculture (USDA). (2011). *Nutrient Database for Standard Reference*. RI
- Wahyudi, A dan Sri, S. (2008). *Bugar Dengan Susu Fermentasi*. Malang : UMM Press
- Walstra P et al. (2006). *Dairy Technology: Principles of Milk Properties and Processes*. CRC/Taylor New York.
- Waryana. (2010). *Gizi Reproduksi*. Yogyakarta : Pustaka Rihama
- Whitney, D. J. & Shultz, D. K. S., (2004). *Measurement Theory in Action: Case Studies and Exercises*. Thousand Oaks: Sage Publications, Inc.
- Whitney, and Rofles. (2005). *Understanding Nutrition. 11th edition*. Belmont: Thomsom Learning, Inc.

- Widodo, Wahyu. (2002). *Bioteknologi Fermentasi Susu. Pusat Pengembangan Bioteknologi*. Malang: Universitas Muhammadiyah Malang.
- Widodo. (2003). *Bioteknologi Industri Susu dan Telur*. Yogyakarta : Lacticia Press
- Widowati, W., Sastiono, A., & Jusuf, R. (2008). *Efek Toksik Logam: Pencegahan dan Penanggulangan Pencemaran*. Penerbit Andi. Yogyakarta, 2-206
- Xia, En-Qia., Deng, Gui-Fang., Guo, Ya-Jun., Li, Hua-Bin., (2010). *Biological Activities of Polyphenol from Grapes*, Int. J. Mol. Sci, 11 : 622-646.
- Yaswir, R., Ira Ferawati. (2012). *Fisiologi dan Gangguan Keseimbangan Natrium, Kalium dan Klorida serta Pemeriksaan Laboratorium*. Jurnal Kesehatan Andalas 2012;1(2) FK-Unand.
- Yildirim, H.İ., Kargioğlu, M. (2015). *The production and utilization of natural keçiboynuz (Ceratonia siliqua L.) syrup in alanya and gazipaşan districts of antalya*. Afyon Kocatepe University Journal of Science and Engineering, 15: 102-108.
- Yogurtçu H and Kamışlı F (2006). *Determination of rheological properties of some pekmez samples in Turkey*. Journal of Food Engineering 77 1064–1068.
- Zakaria, Y., Yurliasni1, M. Delima, dan E. Diana. (2013). *Analisa keasaman dan total bakteri asam laktat yogurt akibat bahan baku dan persentase Lactobacillus casei berbeda*. Agripet. 13(2):31-35.
- Zulganef, (2008). *Metode penelitian social dan bisnis, cetakan pertama*. Yogyakarta : Graha Ilmu.