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SEMINAR NASIONAL

HARI TEMPE NASIONAL 2016

"OPTIMALILASI FUNGSI PANGAN FUNGSIONAL DAN TRADISIONAL DALAM MENINGKATKAN STATUS GIZI DAN MENURUNKAN RESIKO PENYAKIT"

Bandar Lampung, 28 Mei 2016

Fakultas Pertanian
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KATA PENGANTAR

Segala Puji bagi Allah Yang Maha Kuasa atas berkat dan anugerah-Nya prosiding Seminar Nasional dalam Rangka hari Tempe Nasional 2016 dapat diselesaikan oleh Panitia. Seminar Nasional ini merupakan bagian dari rangkaian kegiatan peringatan Hari Tempe Nasional 2016 yang pada tahun ini penyelenggaraaannya dilaksanakan di Provinsi Lampung. Seminar Nasional dengan tema "OPTIMALILASI FUNGSI PANGAN FUNGSIONAL DAN TRADISIONAL DALAM MENINGKATKAN STATUS GIZI DAN MENURUNKAN RESIKO PENYAKIT" diselenggarakan oleh PATPI Cabang Lampung, DPD Pergizi Pangan Lampung, DPD Persagi Lampung, Jurusan Teknologi Hasil Pertanian dan Jurusan Agribisnis Fakultas Pertanian Universitas Lampung, Jurusan Teknologi Pertanian Politeknik Negeri Lampung, Jurusan Gizi Politeknik Kesehatan Tanjung Karang, Pusat Penelitian dan Pengembangan Herbal LPPM Unila dengan dukungan penuh dari US Soybean Export Council (USSEC) dan Forum Tempe Indonesia (FTI). Seminar diselenggarakan dalam satu hari penuh tanggal 28 Mei 2016 di Hotel Horison Bandar Lampung.

Prosiding ini merupakan kumpulan makalah yang telah dipresentasikan pada saat acara seminar serta direvisi untuk memenuhi kaidah penulisan ilmiah. Makalah pada Prosiding ini dikelompokkan dan disusun sesuai dengan topik/bidang yang telah ditetapkan pada saat seminar. Topik/bidang tersebut adalah bidang/topik 1 tentang Pangan Fungsional, bidang/topik 2 tentang Inovasi Produk Pangan dan bidang/topik 3 tentang Keamanan Pangan, Gizi dan Kesehatan Masyarakat. Secara keseluruhan prosiding ini tersusun atas Kata Pengantar, Pendahuluan, kumpulan makalah berdasarkan bidang/topik, dan Susunan Panitia Kegiatan.

Panitia seminar mengucapkan terima kasih kepada semua pihak yang telah memberikan bantuan baik moril maupun materil sehingga acara ini terlaksana dengan baik. Secara khusus Panitia mengucapkan terima kasih kepada Gubernur Lampung, Rektor Universitas Lampung, Direktur Politeknik Negeri Lampung, Direktur Politeknik Kesehatan Tanjung Karang dan Dekan Fakultas Pertanian Universitas Lampung atas izin dan dukungannya terhadap keseluruhan acara. Penghargaan yang tinggi kami sampaikan kepada US Soybean Export Council (USSEC) dan Forum Tempe Indonesia (FTI) yang telah memberikan bantuan pendanaan demi terselenggaranya acara ini. Semoga Allah yang Maha Esa memberikan hidayah dan balasan yang setimpal kepada semua pihak yang telah berkontribusi pada penyelenggaraan seminar nasional dan penerbitan Prosiding ini. Semoga Prosiding ini bermanfaat bagi tercapainya kehidupan masyarakat Indonesia yang sehat dan sejahtera.

Bandar Lampung, 1 Agustus 2016.

Panitia Penyelenggara.

PENDAHULUAN

Tempe merupakan makanan tradisional asli Indonesia yang keberadaannya telah diakui dunia. Sebagai sebuah produk tradisional, tempe merupakan salah satu kekayaan budaya bangsa yang patut dilestarikan. Bukti-bukti ilmiah tentang tempe menunjukkan bahwa tempe bukan hanya bernilai sejarah dan budaya tetapi juga sangat berpotensi untuk dijadikan sebagai makanan bergizi dan makanan fungsional.

Konsumsi tempe Indonesia saat ini mencapai sekitar 7 kg per kapita per tahun dan merupakan 60% dari total konsumsi kedelai (BPS, 2014). Tempe ini disediakan oleh pengrajin tempe tradisional yang jumlahnya mencapai sekitar 100 ribu pengrajin tempe dengan skala produksi yang sangat beragam. Dengan berkembangnya berbagai produk olahan pangan modern yang ditopang oleh iklan yang agresip memunculkan kekhawatiran menurunnya kedudukan tempe di hadapan masyarakat, terutama generasi muda. Pengaruh iklan yang masif yang menawarkan produk bernilai gizi rendah berpotensi menurunkan konsumsi perkapita tempe yang pada akhirnya akan merugikan masyarakat itu sendiri akibat rendahnya asupan gizi.

Menyadari pentingnya tempe sebagai warisan budaya dan sekaligus sumber gizi yang berkualitas maka diperlukan usaha untuk mempertahankan kedudukan tempat di masyarakat dan sekaligus meningkatkan tingkat konsumsinya. Usaha-usaha menciptakan produk olahan pangan berbahan baku tempe harus selalu dilakukan guna mengimbangi keberagaman produk pangan modern yang berkembang pesat di pasaran. Selain itu, pendekatan ilmiah juga harus dilakukan untuk menyakinkan masyarakat akan keunggulan tempe sebagai makanan bergizi dan juga sebagai pangan fungsional. Bukti-bukti ilmiah baru tentang manfaat tempe, khususnya terkait dengan manfaatnya dalam mencegah penyakit, harus selalu dipublikasikan agar masyarakat menyakini bahwa mengkonsumsi tempe adalah sebuah kebutuhan. Akhirnya, untuk bersaing dengan produk pangan modern maka produsen tempe harus memperhatikan kaidah proses produksi tempe yang baik agar syarat-syarat kebersihannya terpenuhi.

Dalam rangka mempertahankan dan mengokohkan tempe sebagai warisan budaya bangsa Indonesia dan mendorong peningkatan tingkat konsumsi perkapitanya maka pada Hari Tempe Nasional ini akan dilakukan berbagai kegiatan yang melibatkan berbagai pihak yang mempunyai komitmen terhadap masa depan tempe. Secara khusus kegiatan yang akan dilakukan dimaksudkan untuk meningkatkan pengetahuan masyarakat tentang kelebihan tempe sebagai makanan bergizi dan makanan fungsional melalui pelaksanaan Seminar Nasional.

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THE USE OF UV-VIS-NIR SPECTROSCOPY AND CHEMOMETRICS FOR IDENTIFICATION OF ADULTERATION IN GROUND ROASTED ARABICA COFFEES

-Investigation On The Influence Of Particle Size On Spectral Analysis-

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ABSTRACT

The adulterations in the ground roasted Arabica coffee samples were prepared by adding ground roasted Robusta bean in the range of 20%-60% from total weight of the samples. However, particle sizes were not uniform in the ground coffee powder. In order to evaluate the effect of particle sizes on UV-Vis-NIR spectra, coffee powder from ground roasted coffee was separated into different particle sizes (841 µm, 595 µm, 420 µm, 297 µm, 210 µm, and 149 µm) by sieving through a nest of U. S. standard sieves (Mesh number of 20, 30, 40, 50, 70, and 100) on a Meinzer II sieve shaker (CSC Scientific Company, Inc. USA) for 10 minutes. Each sample with different particle sizes then were extracted and diluted. The spectral were recorded (wavelength 190-1100 nm) and compared. The result showed that different absorbance spectra were observed for the different particle sizes. In general, absorbance intensity increased as particle size decreased.

Key words: UV-Vis-NIR spectroscopy, particle size, mesh, coffee, absorbance intensity

I. INTRODUCTION

Coffee is one of the most important food commodities worldwide. Among all commodity traded in the world, coffee is number two after crude oil (Esquivel and Jiménez, 2012). There are two important species of coffee which has economic significance in the global coffee trade, species Arabica (*Coffea arabica*) and Robusta (*Coffea canephora*). Both species differ not only in relation to their botanical characteristics and physicochemical composition, but also in terms of commercial value, with Arabica coffees commanding market prices 20–25% higher and being considered to be of better quality than Robusta because of their superior taste and aroma.

The increasing of coffee demand for beverage and its food derivatives is due to the positive perception of coffee as one of natural functional food resources. Even more

reviews that list and discuss the health benefits of functional (Hasler, 2002; Halsted, 2003) do not mention coffee, however, in term of giving benefit into health as one of definition of functional food, coffee has several reason to be one of natural functional food resources. First, several of the ingredients reported as functional components that are found in tea, such as flavonoids (catechins, anthocyanins), caffeic acid and ferrulic acid (Hasler, 2000), are also found in coffee. Coffee also can provide 8% of the daily intake of Cr (chromium) (Santos *et al.* 2004) and can be a substantial source of Mg (Astier-Dumas & Gounelle de Pontanel, 1974). In addition, coffee beverage is rich in biologically active substances such as nicotinic acid, trigonelline, quinolinic acid, tannic acid, pyrogallic acid and, of course, caffeine (Minamisawa *et al.* 2004). Manach *et al.* (2004) also reported that coffee is a rich source of antioxidants of the hydroxycinnamic acids family (caffeic, chlorogenic, coumaric, ferrulic and sinapic acids).

In order to keep the role of coffee as one the natural functional food resources, it is also important to ensure the coffee authentication. Recently, food authentication is a major challenge that has become increasingly important due to the drive to guarantee the actual origin of a product and for determining whether it has been adulterated with contaminants or filled out with cheaper ingredients (Ashurst and Dennis, 1996; Singhal *et al.,* 1997). In particular, assurance of the quality of roasted coffees has attracted widespread attention as a means for controlling and preventing coffee adulteration, and also given the great difference in the final sale price depending on a wide range of factors, including coffee varietal and geographic origin. Therefore, suitable methods are required in order to discriminate between coffee varieties and to detect potential adulterations of high quality coffee beans with poorer and cheaper types, thus ensuring authenticity, quality, safety and efficacy of final products to be commercialized.

Several researches have reported the development of reliable and specific coffee authentication techniques. Many of the recently developed approaches for determining coffee authenticity have focused mainly on coffee identification and classification on the basis of different types of compositional data thanks to the application of different pattern recognition techniques (Bicchi *et al.,* 1997; Briandet *et al.,* 1996a; Briandet *et al.,* 1996b). Despite the relative success achieved by many of these approaches, it is important to consider that many analytical reference methods used to assess the chemical components to be later used as discriminant parameters and solvent for sample extraction may be quite expensive, elaborate and/or time-consuming. For this reason, simpler, faster and chemical free methods, such as those based on spectroscopic techniques which can be easily

implemented in routine analysis, have emerged as a very attractive and useful alternative tool for adulteration identification purposes in several products (Briandet *et al.,* 1996a; Briandet *et al.,* 1996b; Souto *et al.,* 2015; Alamprese *et al.,* 2013; Diniz *et al.,* 2016; Domingues *et al.,* 2014; Aroca-Santos *et al.,* 2016; Biswas *et al.,* 2011).

Using spectroscopic method especially for spectral acquisition of solution samples we need to grind the samples and doing extraction with specific solvent (in this research we use distilled water as solvent for extraction). Grinding samples resulted in powder samples with non-homogen particle size. In this research, we are trying to investigate the influence of different particle sizes of coffee samples on spectral analysis.

II. MATERIALS AND METHODS

2.1. Sample preparation

A number of 2 kg ground roasted Arabica coffee samples were collected directly from coffee farmers at Liwa, Lampung, Indonesia. All samples were grinded using home-coffee-grinder (Sayota). Particle sizes were not uniform in the ground coffee powder. In order to check the effect of particle sizes on UV-Vis spectra, coffee powder from ground roasted Arabica coffee was separated into different particle sizes (841 µm, 595 µm, 420 µm, 297 µm, 210 µm, 149 µm) by sieving through a nest of U. S. standard sieves (Mesh number of 20, 30, 40, 50, 70, and 100) on a Meinzer II sieve shaker (CSC Scientific Company, Inc. USA) for 10 minutes. The sieving conditions were the same for every sample class. These experiments were performed at room temperature (around 27-29°C).

An aqueous extraction procedure of the coffee samples was performed as described by Souto *et al.* (2015). First, 1.0 g of each sample was weighed and placed in a glass beaker. Then, adding 10 mL of distilled water at 90-98°C then mixed with magnetic stirring (Cimarec™ Stirrers, model S130810-33, Barnstead International, USA) at 350 rpm for 5 min. Then the samples were filtered using a 25 mm pore-sized quantitative filter paper coupled with an erlenmeyer. After cooling process to room temperature (for 20 min), all extracts were then diluted in the proportion of 1:20 (mL: mL) with distilled water. UV-Vis-NIR spectra from the aqueous extracts were acquired using a UV-Vis spectrometer (Genesys™ 10S UV-Vis, Thermo Scientific, USA).

2.2. Instrumentation and spectra data acquisition

UV-Vis-NIR spectra in the range of 190-1100 nm were acquired by using a UV-Vis spectrometer (Genesys™ 10S UV-Vis, Thermo Scientific, USA) equipped with a quartz cell with optical path of 10 mm, and spectral resolution of 1 nm at a room temperature. Before the measurements step, blank (the same distilled water used in extraction process) was placed inside of the sample cell to adjust the 100% transmittance signal.

2.3. Data analysis

All recorded spectra data were transferred to computer via USB flash disk and then convert the spectra data from .csv extension into an excel data (.xls). The quality of spectra data were evaluated based on the intensity of absorbance. High absorbance gives more information.

III. RESULTS AND DISCUSSION

3.1. Extraction of coffee samples using different particle sizes

Fig. 1 showed the result of extraction process of coffee samples using two different particle sizes (mesh 20 and 30). It was clear that increasing in particle sizes was followed by increasing of darkness of the extraction solution. Fig. 1 showed that extraction solution of mesh 30 (595 µm of particle size) has darker color than that of mesh 20 (841 µm of particle size). In general we can obtain that decreasing particle size was followed by increasing the dark color of extraction solution.

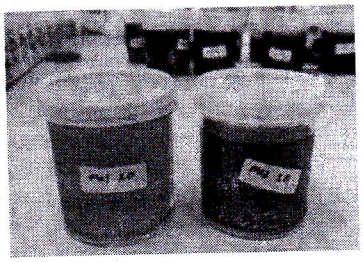

Figure 1. The result of extraction solution for mesh 20 and mesh 30 (particle size of 841 µm and 595 µm).

3.2. Effect of different particle sizes on absorbance properties

UV-Vis-NIR absorbance spectra of coffee powder in the range of 190-500 nm with different particle sizes are shown in Fig. 2. Different absorbance spectra were observed for the different particle sizes of coffee sample. From Fig. 2, it can be seen that absorbance

intensity increased as particle size decreased. The reason for this is coming from the result of extraction solution. Using small particle size the extraction process is more intense since that the area of contact between coffee samples and solvent is increased. It is resulted in darker solution in samples having small particle size. Coffee samples with larger particle sizes have a lower absorbance, and visa versa.

For samples with the same particle size, absorbance is the same. The similar result was also reported by Shan *et al.* (2014). Therefore, in order to reduce the effect of different particle sizes in this study we have to select a certain particle size of coffee samples. This is very important information for next step research of constructing spectral measurement on identification of coffee adulteration.

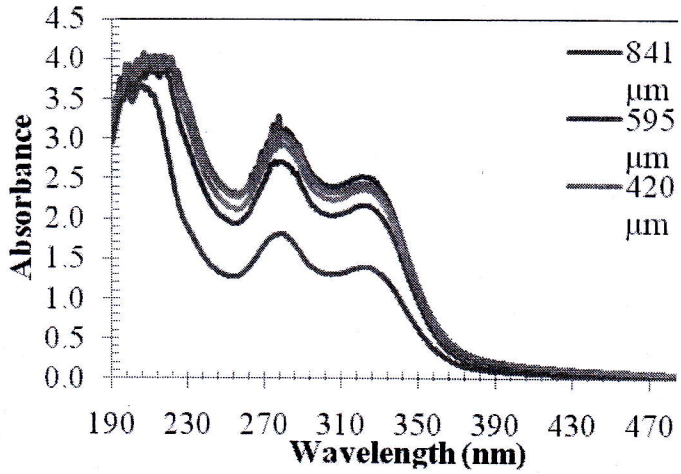

Figure 2. The raw UV-Vis absorbance spectra in the range of 190-500 nm with different particle sizes.

IV. CONCLUSIONS

In this research we showed that preparing a homogen particle size for extraction of coffee powder samples is important due to different of spectral data with different particle sizes. Using small particle size the extraction process is more intense since that the area of contact between coffee samples and solvent is increased. It is resulted in darker solution in samples having small particle size. Our study showed that absorbance intensity increased as particle size decreased. In order to avoid the variability in spectral data it is important to select a specific particle size for preparing samples of coffee powder.

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