

ABSTRAK

DISKRIMINASI KOPI LUWAK TERNAK DAN KOPI LUWAK LIAR MENGUNAKAN *UV-VISIBLE SPECTROSCOPY* DAN METODE SIMCA

Oleh

GHIFARI PRAYOGA NUGROHO

Kopi Luwak merupakan produk kopi yang mengandung rendah kafein dengan cita rasa dan aroma yang khas, kopi Luwak didapatkan dari fermentasi musang Luwak dan bernilai jual tinggi. Biji kopi yang dipilih oleh musang Luwak di alam hanya yang paling masak dan terbaik sehingga produk kopi Luwak menjadi langka, dengan adanya kelangkaan kopi Luwak, harga kopi Luwak menjadi tinggi. Kondisi ini menimbulkan munculnya budidaya musang Luwak dan juga terjadinya mislabeling. Berdasarkan fenomena tersebut penelitian ini bertujuan untuk membangun model dan evaluasi model diskriminasi kopi Luwak liar dan ternak berdasarkan daya serap sampel atau absorbannya dengan menggunakan alat *UV-Visible Spectrometer* dan metode SIMCA. Penelitian ini menggunakan sampel berjumlah 180 sampel yaitu, 1gr kopi Luwak liar (KLL) sebanyak 75 sampel, 1gr kopi Luwak ternak (KLT) sebanyak 75 sampel, dan sampel kopi Luwak campuran (KLC) dengan persentase 10% yaitu 0,9 gram kopi Luwak liar + 0,1 gram kopi Luwak ternak sebanyak 10 sampel, 20% yaitu 0,8 gram kopi Luwak liar + 0,2 gram kopi Luwak ternak sebanyak 10 sampel, 30% yaitu 0,7 gram kopi Luwak liar + 0,3 gram kopi Luwak ternak sebanyak 10 sampel, 40% yaitu 0,6 gram kopi Luwak liar + 0,4 gram kopi Luwak ternak sebanyak 10 sampel, 50% yaitu 0,5 gram kopi Luwak liar + 0,5 gram kopi Luwak ternak sebanyak 10 sampel. Sebelum diuji sampel kopi diekstrak dengan air mendidih suhu 90-100°C, kemudian diencerkan menggunakan *aquades* dengan perbandingan 1:50 ml dan

diaduk menggunakan *magnetic stirrer* selama 10menit. Sampel yang sudah siap diambil spektranya akan dilakukan 2 kali pengulangan pada rentang panjang gelombang *UV-Visible*. Setelah pengambilan spektra, data spektra yang diperoleh selanjutnya dianalisis menggunakan *software Microsoft Excel* dan *The Unscrambler* versi 10.4. Hasil perhitungan PCA spektra *original* PC-1 dan PC-2 berjumlah 93%. Hasil PCA terbaik didapatkan menggunakan data spektra *MSC + Smoothing Moving Average 9 Segment* yaitu sebesar 85%. Hasil plot *X-Loading* pada puncak gelombang 280 nm, dan 330 nm mengindikasikan kafein dan senyawa *trigonelline* pada kopi Luwak. Dari penelitian ini evaluasi Model SIMCA data *Pre-Treatment* yang digunakan untuk mendiskriminasi kopi Luwak ternak dan kopi Luwak liar dapat dikategorikan sebagai klasifikasi sempurna atau *excellent clasification* dengan nilai akurasi 100%, spesifisitas 100%, sensitivitas 100%, dan eror 0%. Berdasarkan kurva ROC KLL+KLT yang menjelaskan hubungan spesifisitas dan sensitivitas, menghasilkan klasifikasi sangat baik dikarenakan semakin dekat dengan garis Y (0,1) pada level signifikansi 0,1%, 0,5%, 1%, 5%, 10% dan 25%.

Kata kunci: Diskriminasi, Kopi Luwak liar, Kopi Luwak ternak, *UV-Visible* Spektroskopi, PCA, SIMCA.

ABSTRACT

DISCRIMINATION BETWEEN OF FEEDING AND WILD LUWAK COFFEE USING UV-VISIBLE SPECTROSCOPY AND SIMCA METHODS

By

GHIFARI PRAYOGA NUGROHO

Civet coffee is a coffee product that contains low caffeine with a distinctive taste and flavour, Luwak coffee is obtained from fermented civet and has high selling value. The coffee beans selected by the civet in nature are only the ripest and best so Luwak coffee products are becoming scarce, with the scarcity of Luwak coffee, the price of Luwak coffee is high. This condition led to the emergence of civet coffee cultivation and also the occurrence of mislabelling. Based on this phenomenon, this study aims to build a model and evaluate the discrimination model of wild and feeding Luwak coffee based on the absorption capacity of the sample or its absorbance using the *UV-Visible* Spectrometer and the SIMCA method. This study used a sample of 180 samples, namely, 75 samples of 1gr wild Luwak coffee (KLL), 75 samples of 1gr feeding Luwak coffee (KLT), and mixed Luwak coffee samples (KLC) with a percentage of 10%, namely 0.9 grams of Luwak coffee. 10 samples of wild Civet coffee + 0.1 grams of live Civet coffee, 20% i.e. 0.8 grams of wild Luwak coffee + 0.2 grams of feeding Luwak coffee as many as 10 samples, 30% that is 0.7 grams of wild Luwak coffee + 0.3 grams 10 samples of feeding Luwak coffee, 40% ie 0.6 grams of wild Luwak coffee + 0.4 grams of feeding Luwak coffee as many as 10 samples, 50% that is 0.5 grams of wild Civet coffee + 0.5 grams of feeding Luwak coffee as many as 10 samples. Before testing, the coffee samples were extracted with boiling water at a temperature of 90-100°C, then diluted using distilled water in a ratio of 1:50 ml and

stirred using a magnetic stirrer for 10 minutes. Samples that are ready for spectra to be taken will be repeated 2 times in the UV-Visible wavelength range. After taking the spectra, the spectral data obtained were then analyzed using Microsoft Excel software and The Unscrambler version 10.4. The PCA calculation results for the original PC-1 and PC-2 spectra were 93%. The best PCA results were obtained using MSC + Smoothing Moving Average 9 Segment spectra data, which was 85%. The results of the X-Loading plot at the peak of the 280 nm and 330 nm waves indicate caffeine and trigonelline compounds in Luwak coffee. From this study, the evaluation of the SIMCA Model of Pre-Treatment data used to discriminate between feeding and wild Luwak coffee can be categorized as perfect classification or excellent classification with 100% accuracy, 100% specificity, 100% sensitivity, and 0% error. Based on the ROC KLL + TLC curve which explains the relationship between specificity and sensitivity, it results in a very good classification because it is closer to the Y line (0.1) at the significance levels 0.1%, 0.5%, 1%, 5%, 10%, and 25%.

Keywords: Discrimination, Wild Civet Coffee, feeding Civet Coffee, UV-Visible Spectroscopy, PCA, SIMCA.