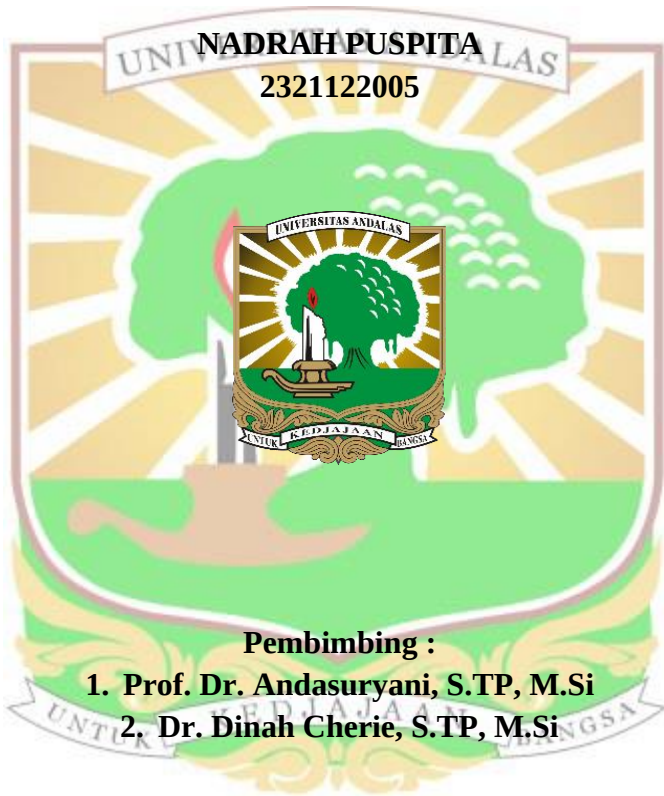


**ANALISIS KANDUNGAN KIMIA DAUN KOPI
KERING SEBAGAI BAHAN BAKU KAWA DAUN
MENGUNAKAN NIR SPECTROSCOPY**

TESIS



Pembimbing :

- 1. Prof. Dr. Andasuryani, S.TP, M.Si**
- 2. Dr. Dinah Cherie, S.TP, M.Si**

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ANALISIS KANDUNGAN KIMIA DAUN KOPI KERING SEBAGAI BAHAN BAKU KAWA DAUN MENGGUNAKAN NIR SPECTROSCOPY

Nadrah Puspita, Andasuryani, Dinah Cherie

ABSTRAK

Kawa daun merupakan minuman tradisional Sumatera Barat yang dibuat dari daun kopi hasil pengasapan, yang kaya akan senyawa bioaktif, seperti fenol, flavonoid, klorofil, magniferen, dan kafein yang bermanfaat bagi kesehatan. Mutu daun kopi kering perlu dijaga agar kandungan kimia seperti kadar air, total polifenol dan kafein tetap optimal. Analisis kandungan kimia umumnya dilakukan secara destruktif melalui analisis laboratorium, namun metode ini kurang efisien karena membutuhkan waktu yang lama dan menghasilkan limbah. Oleh karena itu, diperlukan metode yang lebih efisien menggunakan *Near Infrared Spectroscopy* (NIRS). Penelitian ini bertujuan mengembangkan metode analisis non destruktif berbasis NIRS yang dikombinasikan dengan kemometrik untuk prediksi kandungan kimia dan klasifikasi daerah asal sampel daun kopi kering. Spektra NIR pada rentang 1000-2500 nm dianalisis menggunakan *Partial Least Squares* (PLS), *Principal Component Analysis* (PCA), *Principal Component Regression* (PCR) dan *Linear Discriminant Analysis* (LDA), dengan *pretreatment* SNV, *Gap segment* dan kombinasi SNV+*Gap segment*. Hasil penelitian menunjukkan bahwa metode PLS dengan *pretreatment* SNV+*Gap segment* memberikan performa terbaik dalam prediksi kadar air, total polifenol, dan kafein dengan nilai R^2 berturut-turut 0,92; 0,96; dan 0,97 serta nilai RPD 2,58; 4,55; dan 4,53. Model klasifikasi LDA dengan *pretreatment* *Gap segment* menghasilkan akurasi, *precision*, *recall*, dan *F1-score* sebesar 100% dalam pengelompokan sampel berdasarkan daerah asal. Hasil ini menunjukkan bahwa kombinasi NIRS dan kemometrik efektif sebagai metode non destruktif yang cepat dan akurat untuk analisis mutu daun kopi kering sebagai bahan baku kawa daun.

Kata kunci : Daun Kopi Kering, PLS, PCR, PCA, LDA

ANALYSIS OF CHEMICAL CONTENT OF DRIED COFFEE LEAVES AS RAW MATERIAL FOR KAWA DAUN USING NIR SPECTROSCOPY

Nadrah Puspita, Andasuryani, Dinah Cherie

ABSTRACT

Kawa daun is a traditional beverage from West Sumatra made from smoked coffee leaves, which are rich in bioactive compounds, such as phenols, flavonoids, chlorophyll, mangiferin, and caffeine that provide health benefits. The quality of dried coffee leaves must be maintained to preserve their chemical constituents, including moisture content, total polyphenols, and caffeine. Chemical composition analysis is generally performed using destructive laboratory methods; however, these methods are inefficient because they are time-consuming and generate chemical waste. Therefore, a more efficient method using Near Infrared Spectroscopy (NIRS) is required. This study aimed to develop a non-destructive analytical method based on NIRS combined with chemometrics to predict chemical constituents and classify the geographical origin of dried coffee leaf samples. NIR spectra in the range of 1000–2500 nm were analyzed using Partial Least Squares (PLS), Principal Component Analysis (PCA), Principal Component Regression (PCR), and Linear Discriminant Analysis (LDA), with SNV, Gap segment, and SNV + Gap segment spectral pretreatments. The results showed that the PLS model with SNV + Gap segment pretreatment provided the best performance for predicting moisture content, total polyphenols, and caffeine, with R^2 values of 0.92, 0.96, and 0.97 and RPD values of 2.58, 4.55, and 4.53, respectively. The LDA classification model with Gap segment pretreatment achieved 100% accuracy, precision, recall, and F1-score in classifying samples according to their geographical origin. These findings demonstrate that the combination of NIRS and chemometrics is an effective, rapid, and accurate non-destructive method for evaluating the quality of dried coffee leaves as the raw material for kawa daun.

Keywords : Dried Coffee Leaves, PLS, PCR, PCA, LDA