Title : NIR-Based Predictive Model Development for Antioxidant Activity and Quantification of Bioactive Compounds in *Gymnema inodorum*

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ABSTRACT

Gymnema inodorum, a traditional medicinal plant from Northern Thailand, is known for its antioxidant and anti-inflammatory properties. This study aimed to evaluate the antioxidant activity and bioactive compound content of *G. inodorum* leaves collected from 30 different sources and to develop a predictive model using Near-Infrared Spectroscopy (NIR). Dried and powdered leaf samples were scanned by NIR prior to extraction with 50% ethanol. The extracts were freeze-dried, reconstituted in Type I water, and analyzed for antioxidant activity using DPPH and FRAP assays. Bioactive compounds were quantified using HPLC-DAD. Significant variation in antioxidant activity was observed among samples. In the DPPH assay (10 mg/mL), percentage inhibition ranged from 52.633% to 80.272%, with IC_{50} values between 3.931 and 8.101 mg/mL. In the FRAP assay (5 mg/mL), reducing power ranged from 0.349 to 0.620 mg/mL $FeSO_4$ equivalents. No significant correlation was found between bioactive compound content and antioxidant activity. These results indicate substantial variability among different sources of *G. inodorum*. The data will be used to develop chemometric models based on NIR spectral information for rapid, non-destructive quality assessment.

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