Rapid quality assessment of *Andrographis paniculata* using a developed portable infrared spectroscopy instrument

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*Andrographis paniculata* (Kalmegh), is a popular medicinal plant in India, which is expansively used in Ayurveda, Unani and Siddha medicines as home remedy for various diseases like upper respiratory infections, fever, sore throat, hepatitis and other chronic and infectious diseases(Jayakumar et al., 2013) . The main active constituent is andrographolides and its quantitative determination is crucial for the assessment of its quality. The feasibility of estimating of andrographolides and gradation of *Andrographis paniculata* leaves by near-infrared (NIR) spectrometry has been demonstrated by our laboratory (Sing et al., 2021). However, NIR spectrometers used in this study and also those available in the market and suitable for such purposes are expensive and non-portable.

The goal of this study was to develop a portable near-infrared (NIR) spectrometer for quality assessment of *Andrographis paniculata* based on their andrographolides content. The portable NIR spectrometer was developed using a tungsten halogen lamp, a concave mirror, a prism mirror and a diode array detector. A customized graphical user interface (GUI) was developed by creating and using wrapper DLLs on MATLAB App Designer®. The software controls the measurement process and executes the calibration and prediction algorithms. The prototype was made standalone by incorporating a single board PC with a touch screen display, which enabled portability of the assembled device for on-site use.

A set of 40 *Andrographis paniculata* samples has been used in this paper and calibration models have been developed using Partial Least Square Regression (PLSR). The PLSR model developed using first derivative pre-processed data yielded R2P, RMSEP and RPDP values of 0.99, 0.08 and 8.71 respectively. The results demonstrate the efficacy of the portable NIR spectrometer for estimation of andrographolides in the *Andrographis paniculata* samples. The spectrometer can be used for other marker molecules in plants and their products by suitable modifications in the software.

**Keywords:** Portable NIR, GUI, *Andrographis paniculata*, PLSR

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