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Investigating the links between primary metabolites of medicinal species with leaf hyperspectral reflectance

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Recent studies have shown that the turnover in tree species composition across edaphic and elevational gradients is strongly correlated with functional traits. However, our understanding of functional traits has been limited by the lack of detailed studies of foliar chemistry across habitats and the logistical & economic challenges associated with the analysis of plant functional traits at large geographical scales. Advances in remote sensing and spectroscopic approaches that measure spectrally detailed light reflectance and transmittance of plant foliage provides accurate predictions of several functional chemical traits. In this study, *Pyracantha crenulata* (D. Don) M. Roemer has been used, which is an evergreen thorny shrub species found in open slopes between 1,000 and 2,400 m above mean sea level. *P. crenulata* is used in the treatment of hepatic, cardiac, stomach, and skin disease. In this study the *P. crenulata* leaves samples spectra were recorded using an ASD spectroradiometer and following primary metabolites such as chlorophyll, anthocyanin, phenolic, and sterol were analyzed. The spectroradiometer data were preprocessed using filter and then reduced to a few sensitive bands by applying feature selection to the hyperspectral data. The band values were directly correlated with the measured values. The analysis indicates a significant correlation between *P. crenulata* primary metabolite in the Visible and Infrared region (VISIR). This result suggests that molecules that have important functional attributes could be identified by VISIR spectroscopy, which would save a lot of time and expense as compared to wet laboratory analysis.