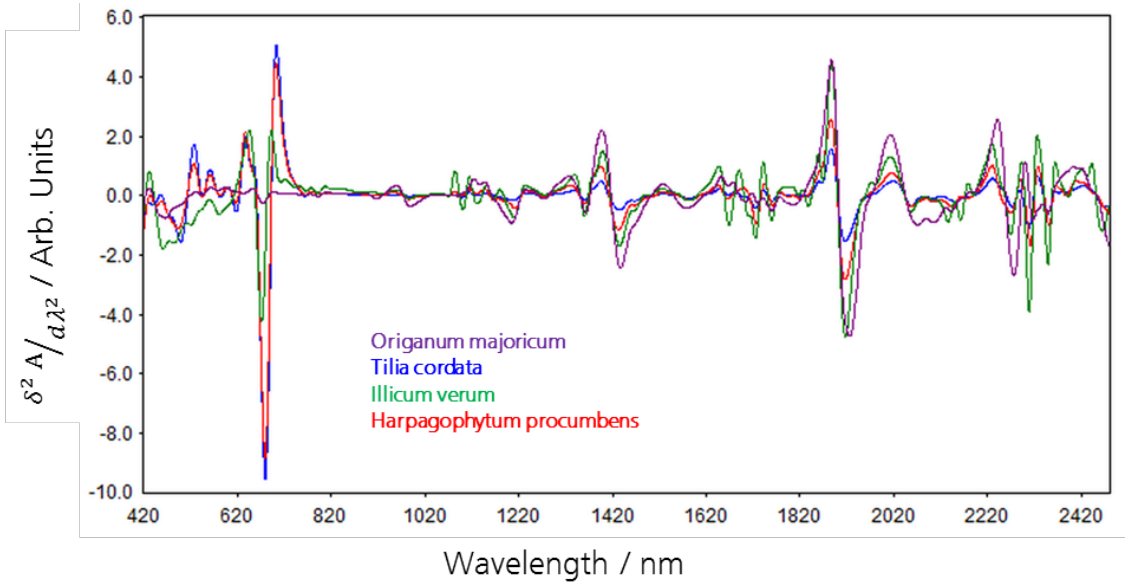
NIR Application Note NIR-27

Identification of 45 aromatic and medicinal plants used in cosmetic and pharmaceutical industry



This Application Note shows that Vis-NIR spectroscopy can identify 45 different aromatic and medicinal plants (e.g. Organicum majoricum and Tilia cordata). The characteristic spectrum of each plant, represented in a spectral library, can be used in raw material identification. In contrast to microscopic identification – which takes several hours and requires trained chemists – the presented Vis-NIR method is extremely fast and can be performed by unskilled operators.

Metrohm NIRSystems

Method description

Introduction

The global market potential for medical and aromatic plants is on increase in the recent past. Medical plants are used as raw materials for production of pharmaceuticals, cosmetics, and food supplements. Therefore, they are not only the basic compounds of traditional medicines, but also modern medicines are derived from medicinal plants. Aromatic plants provide the raw material for the production of flavors in e.g., personal care products. The quality control of medical plants is usually done by microscopic identification or wet chemistry of plant characteristics. Vis-NIR spectroscopy can be used to replace the time-consuming conventional identification method.

Configuration

The following equipment was used **(Tab. 1).**

Tab. 1:

Equipment	Metrohm order code
NIRS DS2500 Analyzer	2.922.0010
Large sample cup	6.7402.050
Vision 4.03 Software	6.6069.102

Experimental

A NIRS DS2500 analyzer (reflection measurement), was used to collect the spectral data of multiple samples of 46 different medical and aromatic plants **(Fig. 1)**. Sample heterogeneity was handled using a rotating sample cup, which allows averaging of 8 single scans. In sum, the natural occurring variation is represented in 546 representative spectra.

Fig. 1: A NIRS DS2500 analyzer was used to record the representative spectra.

In Vision (Metrohm chemometrical software), using the algorithm of residual variance with a threshold of 0.9, a library for the following substances **(Tab.2)**, was developed. The entire wavelength range, covering Vis- and NIR range (400 – 2500 nm), was used and the data were pretreated using a 2nd derivative combined with a Standard Normal Variate (SNV). Cross-validation was applied to verify the performance of the derived library.

Tab. 2:

Aloysia citriodora	Lavendula angustifolia
Angelica archangelica	Lavendula intermedia
Angelica montana	Matricaria recutita
Arctium lappa	Meliisa officinalis
Calendula officinalis	Mentha piperita
Camelia sinensis	Organicum majorana
Cinnamomum verum	Origanicum hirtum
Crataegus monogyna	Origanum majoricum
Crocus sativus	Plantago lanceolata
Curuma longa	Rosa damascene
Elataria cardamomum	Rosmarinus officinalis
Eleutherococcus senticosus	Sambucus nigra
Equisetum arvense	Schinus mole
Euphrasia stricta	Thymus vulgaris
Fraxinus excelsior	Tilia cordata
Galanga officinalis	Tilia platyphyllos
Gentiana lutea	Tilia tomentosa
Glycyrhiza glabra	Valeriana officinalis
Harpagophytum procumbens	Vanila planifolia
Hibiscus sabadarifa	Vitis vinifera
Hypericum perforatum	Withania somnifera
Illiciums verum	

Results

The characteristic spectrum of 45 different aromatic and medicinal plants, represented in a spectral library can be used in raw material identification. **Fig. 2** shows the example spectrum of 4.

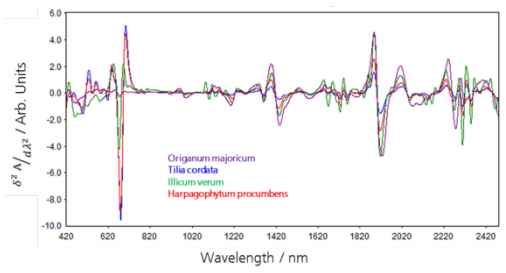


Fig. 2: Characteristic spectra of Organicum majoricum, Tilia cordata, Illicum verum and Harpagophytum procumbens

Metrohm NIRSystems