03-07: Raman spectroscopy shows adaption of pollen composition in *Poa alpina*

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The analysis of pollen is crucial in many fields, ranging from medical and agricultural to environmental research. In fact, environmental factors may influence the chemical composition of pollen as well as its germination and fertilization rates. Variances in the chemistry of pollen grains can be characterized using optical spectroscopy or mass spectrometry in combination with chemometric methods. It has been show, that taxonomic identification of pollen can be obtained using Raman spectroscopy and hierarchical cluster analysis (HCA) [1]. Furthemore, recent results show, that Fourier-transform infrared spectroscopy (FTIR) as well as Matrix-assisted Laser Desorption/Ionisation Time of Flight Mass Spectrometry (MALDI-TOF MS) indicate the adaption of the chemical composition in pollen grains [2,3].

Here, we discuss the advantages and limitations of Raman spectroscopy regarding the characterization of variances in grass pollen grains caused by different populations and environmental influences. We compare the ability to discriminate between different spectra obtained by Raman spectroscopy with other spectroscopic and spectrometric methods using the same set of pollen samples. For this purpose, we use principal component analysis (PCA) in combination with other statistical tools. In addition to Raman spectroscopy, we also use Fourier-transform infrared spectroscopy (FTIR), surface enhanced Raman scattering (SERS) and Matrix-assisted Laser Desorption/Ionisation Time of Flight Mass Spectrometry (MALDI-TOF MS).

As the results show, the information obtained by Raman spectroscopy provides insight into the extent to which physiological parameters manifest themselves in the overall chemical composition. The results may have impact in the broader field of plant biology, including agriculture and biomaterials research.

References

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