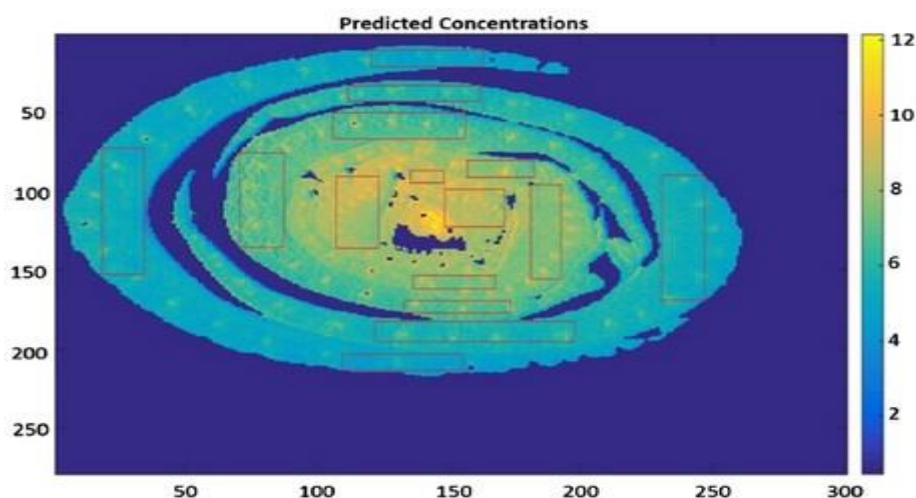


Hyperspectral imaging to determine fennel harvest time

Italy is among the leading fennel producers worldwide with over 20 thousand hectares and an annual harvest close to 500 thousand tons. Fennel is available practically throughout the year and is very popular on the domestic market, although considerable quantities are sent to France and Germany. Fennel can be eaten both raw and cooked and is appreciated for its characteristic sweet aromatic flavour.

"The objective of this study is to use hyperspectral imaging to predict the internal concentration of soluble solids (SSC), individual sugars and organic acids, phenols and antioxidant activities of fennel heads in relation to different sheath layers and harvest times. Thirty-five heads were collected during 7 different harvest times over a period of 3 weeks. For each fennel, VisNIR (400-1000 nm) and NIR (900-1700 nm) images of the perpendicular section were acquired. From the external to the internal part of the fennel, chemical analyses of each leaf were carried out for a total of 160 samples," explained Maria Luisa Amodio.

Similarly, for hyperspectral imaging, three regions of interest (ROI) were extracted and averaged for each corresponding leaf. A calibration set of 105 samples and a validation set of 31 samples were used to develop the PLSR models, after removing 20 samples without correct reference values and 4 outlier spectra. Among the predicted parameters, only SSC, phenols and DPPH could be predicted with satisfactory accuracy.



Mapping of soluble solid concentration in a fennel section.

In addition, it was possible to map constituent concentrations on the hyperspectral images showing an increase of soluble solids, phenolics and antioxidant activity from the external to the internal leaves. As for fennel classification according to harvest time, all classes were distinguished with a non-error rate of 89.29%.

"Results showed the potential of the hyperspectral imaging technique in the Vis-NIR spectral interval to predict internal chemical composition and classify fennel heads according to harvest time. In addition, this technique can supply important information concerning the ripeness of the heads, which can be used to determine the perfect harvest time. These results can also be interesting to implement non-destructive techniques on sorting machines. Other factors like origin, production system or varieties could be studied further to increase the quantity of information that can be obtained by applying this technique," concludes Giancarlo Colelli.

Lien article : <http://www.freshplaza.com/article/171644/Hyperspectral-imaging-to-determine-fennel-harvest-time>