



ASAC



EUROANALYSIS 2009

6 – 10 Sep 2009, Innsbruck, Austria



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DIVISION OF ANALYTICAL CHEMISTRY of the
EUROPEAN ASSOCIATION OF CHEMICAL AND MOLECULAR SCIENCES (EuCheMS)

AUSTRIAN SOCIETY OF ANALYTICAL CHEMISTRY (ASAC)

in cooperation with

AUSTRIAN COUNCIL FOR RESEARCH AND TECHNOLOGY DEVELOPMENT
represented by Günther Bonn (Innsbruck)

INSTITUTE FOR REFERENCE MATERIALS AND MEASUREMENTS (Geel, Belgium)

Venue Congress Innsbruck

www.euroanalysis2009.at

Abstracts

P042-A2

Fluorescence Microscope Images Combined to Chemometric Tools for Recognition of Citrus Varieties

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A total of 48 leaves from 12 greenhouse-grown plants (6-8 months of age) of different varieties of sweet orange (*Citrus sinensis* L. Osbeck) 'Hamilin', 'Pera', 'Laranja Natal' and 'Valência' were evaluated.

The varieties of Citrus showed some particularities that the direct identification is difficult, by visual inspection or other analytical techniques. These points are important considering the manufactures of juice industry need large quantities of the plants and they cannot take any risk about equivocated plants or possible genetic mutations after grafting procedure. In addition, it can cause differences of the quality, flavor, and production of Citrus trees.

In this study, the fluorescence phenomena involve mainly, the color variation profiles from excited fluorescence emissions of the plants using ultraviolet radiation.

The fluorescence images of leaves were obtained using a Zeiss stereomicroscope Stereo Lumar.v12 coupled to digital camera AxioCamMR5 and mercury-vapor short-arc lamp. During the fluorescence microscope imaging it was used 545 ms of exposure and the magnification was 20 times. The mercury-vapor short-arc lamp was utilized to excite the fluorescence.

For each image analysis it were selected a region of 300 x 300 pixels (size of original image 1292 x 968 pixels). This criterion was important to keep the same characteristics during the chemometric analysis.

The colorgram (histogram of frequency colors) was obtained for fluorescence images of following colors: green, red, blue, luminosity, relative red, green and blue, hue, saturation and intensity generating a total of 2560 variables.

Principal Component Analysis (PCA) and Parallel Factor Analysis (PARAFAC) were applied in the data. Both methods confirmed the influence of blue, green and hue colors in the successful classification of the varieties.

This study has paved the way for the taxonomy applications. The potential of this analytical method is to investigate the specific signature of each Citrus plant variety.