SPECTRAL REFLECTANCE ANALYSIS OF TOBACCO LEAVES AND FUNGUS INFECTION DETECTION

Poster presentation

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Optical properties of vegetable matter and associated analytical techniques such as VIS and NIR reflectance spectroscopy were used for several decades in the foodstuff industry (Cozzolino et al. 2003, Norris et al. 1976, Murray 1986). By means of these techniques, is possible to study and determine the plant pathology of crops: health or disease conditions, water stress, growth, etc. (Muhammed 2003, 2005), being a good alternative to traditional chemical or biological tests, generally very invasive and even destructive.

The organized array of reflectance in terms of wavelength, ranging generally from VIS to NIR, is called a "spectral signature" of the given specie. The spectral signature could be modifyed according to plant pathology condition of the sample under analysis, for example its health condition, the presence of diseases, plant growth or maturity, nutritional condition, moisture content, etc.

Tobacco is a crop of great socio-economical importance at the north-west region of Argentina. It can be affected by several pathogens in different stages of growing; among these pathogens, the fungus *Fusarium oxysporum* can make the plant to get withered (Ramallo et al. 2005), causing economical and agricultural damages (yield losses, increased chemical products to control the affection, environmental impact).

The aim of this work is to analyse and quantify the effect of the presence and development of the pathogen *Fusarium* on spectral signatures of Burley tobacco leaves, and to evaluate the potential of radiometric techniques as tools for diagnosis. Measurements of spectral reflectance were performed with Optronic OL 750 spectroradiometer, ranging from 310 nm to 1900 nm. The data correspond to two groups, control –healthy– and test –inoculated with fungus–, and would be taken at 1, 2, 3 and 4 weeks from inoculation.

The analysis of the obtained results by means of a Principal Component Analysis, using Stata 9 software, showed that spectral signatures of tobacco leaves are noticeably modified, in the visible region –associated to colour characteristics– as well as in the NIR region, when the fungus was present.

References

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