

Laser Induced Breakdown Spectroscopy as Analytical Tool for soybeans cultivars discrimination

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The aim of this work was to introduce laser-induced breakdown spectroscopy (LIBS) as a new tool for soybean variety identification measuring the variations of elemental concentration in its leaves, since different cultivars has different elements uptake from soil, resulting in different elemental concentration in the leaves. LIBS performs elemental analysis by measuring the spectral emissions of the analyte in the plasma, with no or very limited sample preparation, avoiding the use of chemical reagents, in a rapidly way, allowing large-scale and real-time monitoring providing data featuring high sensitivity and reliability. The main objective of this work was to show that LIBS associated with chemometric methods could represent a new promising potential economically viable tool for the identification and discrimination of soybean variety. It was used three different soybean cultivars leaves, TMG1188RR, TMG4182 and M9144RR from Parnaíba, Xingu I and Xingu II, respectively, located in Maranhão state, Northeast region of Brazil. Soil management, irrigation, fertilization, temperature were adequate for a correct plant growing. All leaves were collected from a region with low infestation of diseases and pests and their spectral profile are specific for the plant. Only fresh leaves were used. The discrimination of the soybean varieties was performed by a classifier based on the combination of classification via regression and partial least square regression models using cross validation, employing the elemental concentrations measured by LIBS as input data. As result, a confusion matrices was obtained with an average accuracy for correct classification of 99,091% was obtained.

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References:

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