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基于叶片光谱透过特性的植物氮素测定

Plant nutrition indices using leaf spectral transmittance for nitrogen detection

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中文关键词: [叶绿素含量](#) [含氮量](#) [光谱特征参数](#) [分光光谱透过率](#) [无损检测](#)

英文关键词: [chlorophyll content](#) [nitrogen content](#) [spectral feature parameter](#) [spectral transmittance](#) [nondestructive detection](#)

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中文摘要:

该文通过不同施氮水平下营养液栽培的水稻和黄瓜叶片在300~1100 nm的分光光谱透过率, 与其叶绿素含量和含氮量的相关性分析, 确定了560、650和720 nm作为特征波长, 940 nm作为参比波长可用于植物营养的快速无损诊断。以上述波长的光谱透过率构建的21组光谱特征参数中, (T940-T560)/(T940+T560)、log(T940/T560)和log(T940/T650)与水稻和黄瓜叶片的叶绿素含量和含氮量的相关性较好, 且经回归估测检验的相对误差均小于8%。因此, 上述光谱特征参数可作为植物氮素营养指标用于植物叶片的叶绿素含量和含氮量的快速无损估测, 从而为植物营养无损诊断提供技术支持。

英文摘要:

Spectral transmittances in wavelength ranged from 300 to 1100 nm of rice and cucumber leaves treated with culture solution in five different nitrogen levels were measured in this study. The correlated relationships between the above spectral transmittances and their chlorophyll contents and nitrogen contents indicated that the 560, 650, and 720 nm as feature wavelength and 940 nm as reference wavelength were useful for plant nutrient diagnosis. Correlation analysis and their regression examination between 21 spectral feature parameters composed by the transmittances at above wavelength, and the leaf chlorophyll contents and nitrogen contents showed that spectral feature parameters of (T940-T560)/(T940+T560), log(T940/T560) and log(T940/T650) were available for plant nutrient diagnosis with less than 8% relative error in measurement tests of rice and cucumber leaves. Therefore, the above spectral feature parameters as plant nitrogen indices can be used to estimate the chlorophyll content and nitrogen content and thus support for nondestructive plant nutrient detection.

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