

技术应用

SO<sub>2</sub>污染环境下水稻导数光谱与生理生化指标的相关性研究

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摘要:

通过田间开顶式小区熏气试验, 研究在SO<sub>2</sub>急性伤害条件下水稻冠层导数光谱与叶片含硫量、叶液pH值以及叶绿素含量的相

关性。分别选择分蘖期和抽穗期显著相关的波段(分蘖期: 689 nm、584 nm、570 nm; 抽穗期: 689 nm、584 nm、585 nm)建立

预测叶片含硫量、叶液pH值及叶绿素含量的回归模型, 并分别用拔节期和灌浆期相应导数光谱反射率检验模型预测精度。结果表明

, 由分蘖期建立的回归模型估测拔节期叶液pH值以及叶绿素含量与实测值之间相关系数分别为0.884和0.630; 由抽穗期建立的回

归模型估测灌浆期的叶片含硫量、叶绿素含量与实测值之间相关系数分别为0.659和0.768,均通过显著检验。

关键词: 二氧化硫; 水稻; 一阶导数光谱; 叶液pH值; 含硫量; 叶绿素含量

THE CORRELATION BETWEEN DERIVATIVE SPECTRA AND SOME BIOPHYSICAL-BIOCHEMICAL INDICES OF RICE UNDER SO<sub>2</sub> POLLUTION

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Abstract:

Field experiments were conducted in a split plot with three rice varieties. Rice samples were exposed to

sulfur dioxides of different concentrations inside a fumigation chamber. After the measurement of visible and near

infrared radiance of the canopies of rice, leaves of rice canopy were sampled to analyze pH of extracted leaf

fluid and chlorophyll concentration and sulfur content of rice leaves. The correlation between these biophysical-

biochemical indices and the first derivative spectral reflectance shows that the first derivative spectral

characteristics which are significantly correlated with sulfur content, pH and chlorophyll concentration can be

selected to estimate the biophysical-biochemical indices with regression models using 689nm, 584nm and 570nm at

the tiller stage, and using 689nm, 584nm and 585nm at the heading stage respectively. The first derivative

扩展功能

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spectral reflectance of 689nm, 584nm and 570nm at the jointing stage, and 689nm, 584nm and 585nm at the filling

stage can be used to test the accuracy of regression models. The correlation coefficients between measured values

of the jointing stage and estimated values of the tiller stage for estimating models are 0.498 (estimated sulfur

content), 0.884 (estimated pH) and 0.63 (estimated chlorophyll concentration) respectively. In addition, the

correlation coefficients between measured values and estimated values are 0.66 (sulfur content), 0.768 (chlorophyll concentration) and 0.50 (pH) respectively.

Keywords: Sulfur dioxide Rice the first derivative spectral reflectance pH of extracted leaf fluid; Chlorophyll concentration Sulfur content

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