

水稻氮素机器视觉诊断最佳叶位和位点的选择研究 Determination of Suitable Leaf for Nitrogen Diagnosis in Rice Based on Computer Vision

祝锦霞 邓劲松 林芬芳 王珂

浙江大学

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摘要: 选用扫描仪获取水稻叶片的数字图像, 通过比较第1和第3完全展开叶 (L1和L2) 颜色参量的空间分布, 研究基于机器视觉技术的水稻氮素诊断的最佳叶位和位点选择。结果表明基于机器视觉的水稻氮素营养诊断是有理论依据的, 能反映出叶片的营养状况; 选择  $B$ 、 $b$ 、 $b/(r+g)$ 、 $b/r$ 、 $b/g$  作为最优颜色特征参量; 比较颜色特征参量对应的变异系数 $CV$ , 得到低氮处理的 $CV$ 明显高于正常氮素水平, 同时 $CV$ 随着叶位的增加而减小; 不同位点的 $CV$ 其叶尖和叶基的变化幅度较为接近, 不同位点间差异不显著。初步研究选择第3完全展开叶作为水稻无损氮素诊断的最佳叶位。Prior research indicated that leaves at different positions responds differentially to the spectral characteristics under different nitrogen rates. A method based on the computer vision technology was proposed, by comparing the spatial differences of color parameters which was captured from the scanned images of upper fully expanded leaves. The result illustrated that the diagnosis of rice based on the scanned image under different N rates is able to partly reflect the hyperspectral properties. And the  $B$ 、 $b$ 、 $b/(r+g)$ 、 $b/r$ 、 $b/g$  were selected as the optimum color parameters. The coefficient of variation (CV) of the color parameters is higher at low N condition than normal. Furthermore, CV decreases with the increased leaf position. Meanwhile, the difference of CV at different part of the leaf is not obviously. The preliminary research concluded that the third fully expanded leaf can be applied as the ideal indicator to quantify the different status of nitrogen.

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