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棉花植株水分含量的高光谱监测模型研究

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Monitoring Models of the Plant Water Content Based on Cotton Canopy Hyperspectral Reflectance

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摘要 参考文献 相关文章

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摘要 精确灌溉对无损、快速的水分监测技术有迫切需求。研究棉花冠层高光谱参数与水分的定量关系并建立水分估测模型，以实现棉花水分及时、准确监测。通过2年试验，测定棉花冠层高光谱及植株水分，根据光谱参数与植株含水量的相关关系，建立了植株含水量监测模型。结果表明：棉株含水量与叶片含水量在一定范围内随灌溉量增减而增减，并能区分棉花干旱程度；棉株及叶片含水量与冠层460～514 nm、605～698 nm、1451～1576 nm 和1960～2457 nm反射率极显著负相关，与727～1345 nm反射率极显著正相关，且棉株的相关性好于叶片含水量。所选作物水分指数、归一化差值水分指数1、归一化差值水分指数2、水分胁迫指数1、水分胁迫指数2、水分波段指数、水分指数与归一化差值植被指数之比均与棉株及叶片含水量极显著相关；构建了棉株含水量和叶片含水量的最佳监测模型；所建模型精度能满足大田生产对棉花水分监测的要求。

关键词： 棉花 冠层光谱 植株水分含量 监测模型

Abstract： The objectives of this study were to determine the quantitative relationships between spectral reflectance of canopy-scale with plants water content, to develop the plant water content monitoring models. Through 2-year trial of different irrigation in cotton, the optimal monitoring models to cotton water content were acquired. The results showed that the vegetation water content and leaf water content varied with the amount of irrigation in certain water content range. Vegetation water content and leaf water content can be used to distinguish different levels of drought cotton. The significant negative correlation between vegetation water content and reflectance at 460-514 nm,605-698 nm,1451-1576 nm and 1960-2457 nm were observed respectively. The significant positive correlation between vegetation water content and reflectance at 727-1345 nm were also observed respectively. The correlation between vegetation water content and reflectance was better than that of leaf water content and reflectance. The correlations between water index, normalized difference water index1, normalized difference water index2, moisture stressed index1, moisture stressed index2, water band index, water index/normalized difference vegetation index and vegetation water content, leaf water content respectively were remarkable significant. The model to estimate vegetation water content and leaf water content were set up respectively. The monitoring precision of two models was able to meet the needs of field production.

Keywords： cotton canopy spectra plants water content monitoring models

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