作物水胁迫声发射检测及视情灌溉系统的研究

Test of Water Stress in Crops With Acoustic Emission Technology and Automatic Irrigation System

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英文关键词：acoustic emission technology； water stress in crops; virtual instruments; transpiration

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中文摘要：

研究和开发了利用声发射技术检测作物的水胁迫并视情实施自动灌溉的系统，以西红柿作物为目标在温室内进行了试验研究。结果表明：在一定程度范围内，作物受水胁迫时发出悲鸣的频次随作物水胁迫的程度的增加而增加，并与作物的蒸腾加速度有关；为避免作物受水胁迫的影响，可通过声发射传感器所获得的作物信息实现对作物视情灌溉和调节；使作物的蒸腾量和灌溉量达到平衡调节，力求使作物在最佳的土壤水环境下生长,提高水的利用率,改善作物果实品质。

英文摘要：

The automatic and real-time irrigation system based on estimation of water stress in crops with acoustic emission (AE) technology was developed. Taking the tomato crops as a testing example in greenhouse, the system can acquire the real-time AE signals and transpiration data respectively through AE sensor and electronic balance, and the computer program of an optimum algorithms for the irrigation system was also produced based on the AE signals and transpiration data. It shows that the AE events increase gradually with the increase of transpiration speed of crops to some extent. In order to keep the crops growing well, it has the potential to indirectly detect and monitor the water stress in tomato crops based on the information acquired from the crops through AE and transpiration.

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