



发光学应用及交叉前沿

基于NIR高光谱成像技术的长枣虫眼无损检测

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摘要: 为了研究快速识别虫眼枣与正常枣的有效方法,利用特征波长主成分分析法结合波段比算法进行虫眼枣识别。首先,利用NIR高光谱成像系统采集130个长枣(50个正常、80个虫眼枣)图像,提取并分析不同类型长枣特征区域的平均光谱曲线,对970~1 670 nm范围内的光谱数据进行主成分分析,确定7个特征波长(990,1 028,1 109,1 160,1 231,1 285,1 464 nm)。然后,对长枣图像做主成分分析,选择PC2图像进行虫眼识别,虫眼与正常枣的识别率分别为67.5%、100%。为了进一步提高虫眼枣的识别率,采用波段比(R1231/R1109)对未识别的虫眼枣进行再次识别,识别率提高到90%。结果表明,基于NIR高光谱成像技术的检测方法对虫眼枣识别是可行的,同时也为多光谱成像技术应用于在线检测长枣品质提供了理论依据。

关键词: 高光谱成像 无损检测 长枣 虫眼

本刊中的类似文章

1. 用于农田土壤监测的高光谱成像仪[J]. 2013, 34(6): 807-810

Non-destructive Detection of Insect Hole in Jujube Based on Near-infrared Hyperspectral Imaging

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Abstract: In order to study an effective method for quickly detecting the intact jujubes and insect hole jujubes, principal component analysis (PCA) on the optimal wavelengths combined with band ratio were applied to identify the insect hole jujubes. First, the hyperspectral images of jujube in the spectral region between 900 nm and 1 700 nm were acquired for 130 jujube samples (50 intact, 80 insect hole), and obtained region of interests (ROIs) as an average spectral of various jujubes, the wavelengths between 970 nm and 1 670 nm were analyzed and combined with PCA method to determine seven feature wavelengths (*i.e.* 990,1 028,1 109,1 160,1 231,1 285,1 464 nm). Next, the PCA method was performed again based on important wavelengths and the second principal component (PC2) was used to classify insect hole jujubes. The classification rate of insect hole jujubes and intact jujubes was 67.5%, 100%, respectively. To improve identification rate, band ratio (R1231/R1109) was utilized to distinguish the previously unidentified jujubes and the classification rate of insect hole jujubes was from 67.5% to 90%. The results show that the hyperspectral imaging technology can be used to effectively identify the insect hole jujubes, in the meantime, which can provide research basis for online detection of jujube quality using multispectral imaging technology.

Keywords: hyperspectral imaging non-destructive detection long jujubes insect hole

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