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漫透射法无损检测荔枝可溶性固形物

Non-destructive measurement of soluble solid content in litchi by visible/near-infrared transmission spectroscopy

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英文关键词:near-infrared spectroscopy models nondestructive examination Litchi soluble solids content diffuse transmission

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中文摘要:

为了快速无损检测荔枝内部品质并为荔枝快速检测分级提供科学依据，研究荔枝可溶性固形物无损检测途径。该文首先针对荔枝果皮较硬而且凹凸不平的特征，比较了漫反射法和漫透射法的试验效果，接着采用多种预处理方式对漫透射光谱进行了处理，并采用连续投影算法结合相关系数法优选建模波长，最后比较了最小二乘法和神经网络法的建模效果。试验结果显示漫透射方式是较好的荔枝光谱采集方式；通过连续投影算法结合相关系数法，从全部500个波长变量中最终提取出11个优选波长，只占波长总数的2.2%；基于这11个波长的神经网络模型的预测相关系数为0.867，预测均方根误差为0.370%。结果表明基于漫透射法进行荔枝可溶性固形物无损检测是可行的。

英文摘要:

In order to provide a scientific basis for litchi quick and nondestructive detection and classification based on litchi internal quality, the nondestructive testing approach of litchi soluble solids content was studied. First, in the light of litchi hard and rough pericarp, results of diffuse reflectance and transmission experimental methods were compared. And then a variety of pretreatment methods were used to process diffuse transmission spectroscopy. The successive projections algorithm combined with correlation coefficient method was used to select optimal modeling wavelength. At last, partial least squares model and neural network model were built to predict the SSC of litchi. The results showed that diffuse transmission method was better than diffuse reflectance method for litchi spectrum acquisition; After variable compression, 11 preferred wavelengths were extracted, only accounts for 2.2% of the total 500 wavelengths; Based on the 11 wavelengths, the correlation coefficient of the BPNN model for predicted SSC of litchi was 0.867, and the root mean square error was 0.370%. The results indicate that the nondestructive detection for litchi soluble solids content based on diffuse transmission method is feasible.

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