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信息科学

近红外光谱结合极限学习机识别贮藏期的损伤猕猴桃

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摘要： 为了及时、准确地识别采摘后贮藏期间的损伤猕猴桃，降低果实腐烂及交叉感染带来的损失，采用近红外漫反射光谱技术结合极限学习机（ELM）建立了采摘后2 ℃冷藏下10天内的碰撞损伤猕猴桃、挤压损伤猕猴桃与无损猕猴桃的动态判别模型。分别比较了无信息变量消除法（UVE）与连续投影算法（SPA）结合UVE优选特征波数建模对简化模型、提高预测性能的影响。结果表明，碰撞损伤猕猴桃比挤压损伤猕猴桃更容易同无损猕猴桃区分开来，且随着贮藏时间的延长，损伤猕猴桃更容易被识别；UVE-SPA-ELM模型的判别效果最好，在采后贮藏10天内预测集中损伤猕猴桃和无损猕猴桃的总正确识别率为92.4%。该检测技术具有较高的检测精度和适用性，可用于快速、无损鉴别损伤猕猴桃。

关键词： 近红外光谱 图像识别 猕猴桃 贮藏期 极限学习机

Identification of bruised kiwifruits during storage by near infrared spectroscopy and extreme learning machine

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Abstract: To detect bruised samples from intact kiwifruits and to reduce the loss caused by decay fruits and cross-infection, the near infrared diffused reflectance spectroscopy and an Extreme Learning Machine (ELM) were coupled to establish a model to discriminate collided, pressed and intact kiwifruits during 10-day storage at 2 ℃. The effect of the discriminant models using the feature variables based on Uninformative Variable Elimination (UVE) and the characteristic wavelength by Successive Projection Algorithm (SPA) combined with UVE on simplifying model and improving prediction performance was compared. The results show that the collided samples can be distinguished easier than pressed ones from intact kiwifruits. Bruised kiwifruits can be recognized easier with the expansion of storage period. UVE-SPA-ELM model has optimal discriminant performance with a discriminant rate of 92.4% for total prediction set samples. This detection technique has a high measurement precision and applicability, and can be used to identify bruised kiwifruits nondestructively and rapidly.

Keywords: Near Infrared Spectroscopy(NIRS) Image recognition kiwifruit storage period extreme learning machine

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