

DETERMINATION OF DICHLORVOS CONTAMINATION ON NAVEL ORANGE SURFACE USING VIS-NIR SPECTROSCOPY

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In order to ensure edible safety, more regard has been paid to pesticide contamination on agricultural product. Conventional techniques are used to measure pesticide contamination. However, the conventional analyses are not possible because of their destructive characteristic and the limitation of time and labor. Spectral technique can provide a rapid, nondestructive means to assess quality and safety of agricultural commodities. The simplicity, precision and accuracy of near infrared (NIR) spectroscopy technique, in combination with the advances in chemometrics, have extended its use to agriculture.

A procedure has been developed for Vis-NIR determination of dichlorvos contamination. A total of 160 navel oranges which have been sprayed dichlorvos solution were separated into two sets, one was calibration set (110 samples), and the other was prediction set (50 samples). The samples were scanned with a QualitySpec spectrometer (Analytical Spectral Devices, Inc., USA) in a range from 350 to 1800nm. The amount of dichlorvos in the solution was measured by SP-6890 gas chromatograph (Lunan Rui Hong Chemical Co., Ltd. China). Four spectral pre-processing methods, including multiplicative scatter corrections (MSC), standard normal variate (SNV), first derivative (FD) and second derivative (SD) were used to reduce or eliminate scatter effects. In addition to the spectral pre-processing, least squares support vector machines (LS-SVM) was performed to establish the prediction models of dichlorvos

residue by software Matlab 7.0; meantime, the use of different spectral pretreatment methods on prediction models were compared. It is found that dichlorvos residue can be predicted from LS-SVM model after application of the pre-processing of FD. The result is: in the prediction set, the root mean squared error of prediction samples (RMSEP) and the correlation coefficient R_{pre} were 6.2598 and 0.8174, respectively, shown in figure 1.

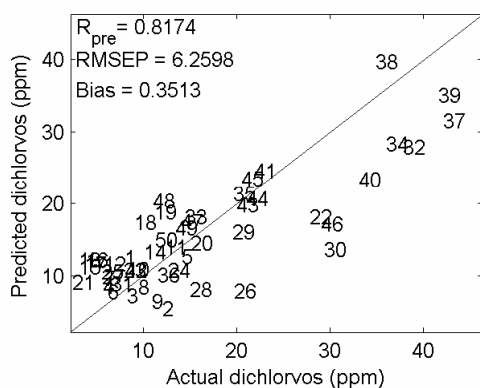


Fig.1 Predicted vs. actual dichlorvos content of the prediction sets