

Nondestructive Determination of Sugar Contents in Shingo Pears with Different Temperature

Kang J. Lee* and Kyu H. Choi

*National Agricultural Mechanization Research Institute, Suwon, 4410-100, Korea
jini2002@rda.go.kr*

The affect of surface temperatures of fruits on spectrum which measures actual sugar contents was observed. PLSR was applied to develop the sugar content evaluation system that was not affected by temperature.

The reflected spectrum was used at the wavelengths of 654 and 1052nm with the separation distance of 2.5nm. To increase the conformance of a model using unknown samples, let the minimum value of PRESS be an optimum factor. 71 Shingo pears stored in a refrigerator were left in a room temperature for a while and these temperatures and reflected spectrums were measured. Reflected spectrums were measured at the wavelengths of 654 and 1052nm, 3 samples in one second. To measure these at different temperatures, the experiment was repeated hourly and four times. Starting temperatures of 2-3 were increased up to 17. The total number of measured spectrum was 284. To develop a sugar content evaluation system model using measured reflected

spectrum, three groups of samples were considered. First group had 51 samples at 14 and second group had 141 samples with lower or higher temperatures than 14. Third group had 155 samples with well distributed temperatures. Other samples were used as validations to ensure the conformance. Measuring the sugar contents of samples with surface temperatures other than 14 were difficult with PLS model I, developed by using a sample temperature of 14. If the sugar contents were compensated using samples' temperatures, results of prediction would be close to the expected results and it would be one of the most important factors to develop this system.

PLS models I and II could compensate the temperature but the precision would not come up to the standard. High precision was expected by using samples with wide ranges of temperatures and sugar contents. Both models showed the possibility of an improvement of a sugar content evaluation system disregarding the temperature. For practical use of a system, selecting samples should be done carefully to reduce the effect of the temperature.