Development of robust Calibration for Determination Apple Sweetness using Near Infrared Spectroscopy

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The sweetness (° Brix) of fruit is the main quality factor contributing to the fruit taste. The brix of the apple fruit can be measured non-destructively by near infrared (NIR) spectroscopy, allowing the sweetness grading of individual apple fruit. However, the fruit quality is influenced by various factors such as growing location, producing year, variety and harvest time etc., accordingly the robust NIR calibration is required. In this experimental results are presented the influence of two variations such as growing location and producing year of apple fruit in establishing of calibrations for sweetness, and developed a stable and highly accurate calibration.

Apple fruit (*Fuji*) was collected every year from 1995 to 1997 in 3 different growing locations (Andong, Youngchun and Chungsong) of Kyungpook in Korea. NIR reflectance spectra of apple fruit were scanned in wavelength range of 1100~ 2500nm using an InfraAlyzer 500C (Bran+Luebbe) with halogen lamp and PbS detector. The multiple linear regression and stepwise was carried out between the NIR raw spectra and the brix measured by refractometer to select the best regression equations.

The calibration models by each growing district were well predicted to dependent sample set, but poorly predicted to independent sample set. Combined calibration model using data of three growing districts predicted reasonable well to a population set drawn from all growing districts(SEP = 0.69%, Bias = -0.075). The calibration models by each harvest year were not transferable across harvest year, however a combined calibration model using data of three harvest years was sufficiently robust to predict each sample sets(SEP = 0.53%, Bias = 0.004).