Development of Near Infrared Spectroscopy(NIRS) Equation of Crude Protein in Wheat Germplasm

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Wheat is mainly composed of carbohydrate but it contains a moderate amount of protein, which gives a very useful characteristics to flour food such as the unique elasticity and stickiness of the dough. We developed a calibration equation for analyzing crude protein content using Near Infrared Spectroscopy to quick analyze the crude protein content of wheat germplasm stored in the National Agrobiodiversity Center, RDA, Korea. The 1,798 wheat germplasms were used to draw up the calibration formula. The crude protein's interval distribution of 1,798 wheat germplasms used for the calibration was 7.04-20.84%, the average content was 13.2%, and standard deviation was 2.6%. The germplasms distribution was composed of a suitable group for the preparation of the calibration formula because the content distribution was a normal, excluding the 13.0-15.5% content section. In order to verify the applicability of the NIRS prediction model, we measured the crude protein content of the 300 wheat germplasms that were not used for the calibration using both Kjeldahl analysis and NIR spectrum. The analysis value calculated using each method were statistically processed, and the test results and statistical indicators of the predictive model were compared. As a result, The R^2 value of the optimized NIRS prediction model was 0.997, and the Standard error of Calibration value(SEC) was 0.132, and slope value was 1.000. With prediction model selection, compared to Kjeldahl method, R^2 values were 0.994(Kjeldahl), 0.998(NIRS), and the SEC value were 0.191 and 0.132, respectively, comparing the statistical indices of the forecast model. And slope value were 1.013, 1.000, respectively. The analysis of crude protein content by the NIRS predictive model developed by each statistical index showing similar figures is judged to show a high degree of correlation with the Kjeldahl analysis. The proven calibration equation will be used to measure the crude protein content of wheat germplasms held by the National Agrobiodiversity Center, and by dividing the wheat germplasms by their use according to the crude protein content, it will provide useful information to relevant researchers.

Key words: Wheat, Crude protein, Germplasm, NIRS, Calibration equation

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