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NIRS based food quality assessment approaches for cereals, oilseeds, pulses, fruits and vegetables

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Near Infrared Spectroscopy (NIRS) technology has played a significant role in quality control and monitoring of raw materials and finished products for the last 25 years. It is routinely used in agriculture and food industry for quality analysis of seeds, flours, fruits, vegetables, beverages and many more. It is relatively inexpensive, rapid and non-destructive analytical method used for estimating several food constituents' viz., moisture, protein, fat, sugars, starch, dietary fiber, amino acids, fatty acids, phenols, phytates, oxalates, organic acids etc. In our lab we have developed NIRS based prediction models of high precision for different agro-horticultural crop plants for multiple biochemical parameters. More than 5000 diverse germplasm accessions belonging to oilseeds (Brassica, safflower, sunflower, niger, linseed, soybean etc.), legumes (pea, cowpea, chickpea, pigeon pea, green gram, black gram, lentil etc.), cereals, pseudo cereals and millets (wheat, maize, barnyard milled, kodo millet, pearl millet, finger millet) and eggplant fruits have been scanned on Foss Tecator NIRS 6500 model. WINISI II software with regression method of Modified Partial Least Square was used with spectrum from 400-2500 nm at a gap of 2 nm. Mathematical treatments with 1st, 2nd, 3rd and 4th order derivatives were employed using several combinations of gap and smoothening to identify the best fit model. Scatter correction using Standard Normal Variate and Detrending (SNVD) were also applied in the calibration to reduce the differences in spectra related to physical characteristics. Prediction equations having low value of standard error of cross validation and high value of coefficient of determination were selected. The performance of calibration and accuracy of equation was further confirmed by ratio of standard deviation of reference data to corrected standard error of prediction. It was observed that prediction models developed from 2nd derivative were suitable for most parameters however phenolics, sugars, zinc and copper prediction equation from 3rd derivative were more precise.

Biography

Rakesh Bhardwaj is currently a Senior Scientist at ICAR-National Bureau of Plant Genetic Resources, India.

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