

**APPLICATION OF A PORTABLE INFRARED TECHNOLOGY
(PIRT) FOR SCREENING SUGAR AND ASPARAGINE
LEVELS IN CHIPPING POTATOES**

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Most common methods used for sugar and asparagine analyses in raw potatoes or acrylamide levels in cooked products are time consuming and labor intensive, making efficient assays for rapid, accurate and “in-field” testing desirable. Our objective was to evaluate a portable infrared technology (PIRT) for rapid quantitation of acrylamide precursors in chipping potato varieties and acrylamide levels in cooked products. Samples representing a total of 48 experimental and commercial varieties were obtained from OARDC in Wooster (OH). As reference methods, sugar and asparagine levels were determined using HPLC-RID and GC-FID, respectively. Samples encompassed a wide range of sugar levels (0.8-6.9mg glucose, 0.5-9.2mg fructose and 1-4.7mg sucrose per 1g fresh weight) and asparagine levels (4.9-23.8mmol/kg fresh weight). Ten varieties of potatoes were also made into slices and fried for acrylamide analysis by LC-MS/MS. Transmission, single and five bounce ATR accessories were used for infrared spectra collection. Partial Least Squares Regression calibration models (n=37) were developed to predict sugar and asparagine levels in unknown potato samples (n=11). Excellent linear correlations between infrared predicted and reference values from HPLC and GC were obtained for independent sample set. PLSR models gave high rPred (correlation coefficient for prediction) (>0.90) and very low standard errors of predictions. PIRT allows for the rapid, inexpensive, high throughput and accurate measurement of tuber sugar and asparagine levels and gave promising results for prediction of acrylamide in potato chips upon frying. Therefore; PIRT can significantly benefit potato breeding and certain aspects of crop management, production and research.

Keywords: Infrared, chipping potatoes, asparagine, reducing sugars

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