Abstract

Determination of soluble solids in Açaí (*Euterpe oleracea* Mart.) pulp by means of near infrared spectroscopy

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Introduction

Açaí consumption is increasing worldwide due to growing recognition of its nutritional and therapeutic value. In order to establish minimum quality standards for pulp consumption, the Brazilian Ministry of Agriculture, Livestock and Food Supply defines açaí pulp as the edible portion obtained from açaí fruit (*Euterpe oleracea* Mart.) by adequate technological processes after softening. This produce is classified based on water content as follows; thick or special (type A) with 14% soluble solids (SS), medium or regular (type B) with 11 to 14% SS, and slim or popular (type C) with 8 to 11% SS. The determination of SS in pulp is time-consuming, tedious and does not fit in modern food plants. As NIR systems have been implemented to measure various quality attributes of food products, the objective of this study was to evaluate the feasibility of NIR diffuse reflectance spectroscopy to quantify the soluble solids content of açaí pulp.

Materials and Methods

Frozen açaí pulp samples were obtained from two companies in Pará State, Brazil, at various times during 2010 (February, April, May, June, July, August and September). Pulp was freeze-dried for 48 hours to obtain dry samples. From each month, a set of dry samples were weighed and water was added in order to obtain the following SS content: 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16% (w/v). After temperature stabilisation (~25°C), spectra were collected in diffuse reflectance mode (4,000-10,000 cm^{-1}) on glass flasks containing açaí pulp samples (64 scans, spectral resolution of 16 cm^{-1}). Soluble solids content of individual samples was determined using the AOAC (1998, 925.23) reference method. Original spectra were not pre-processed and PLS regression models were constructed to predict the content of SS in the açaí pulp.

Results and Discussion

The global model including açaí pulp samples from different months (February, April, May, June, July, August and September) did not show any segregation between each period. The largest differences in the spectra were found around the water absorption peaks (4.550 to 5.350 cm^{-1}) and OH combination bands (6.150 to 7.500 cm^{-1}). An optimum PLS model required one latent variable (PC1 = 97%) presenting values for RMSEC (1.06) and R2 (0.87) for the calibration data set, and RMSECV = 1.03% and R2 = 0.89 for internal cross-validation. External validation using an independent data set showed good performance based on RMSEP (1.33%), SEP (1.72) and R^2 (82%) indicating that this model was adequate to determine soluble solids in açaí pulp.

Conclusion

NIR spectroscopy can be successfully used to determine soluble solids in açaí pulp and this technology can be used to classified açaí pulp according to its minimum quality standards.

Reference paper as:
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