Abstract

Blueberries (*Vaccinium corymbosum* L.) are interesting fruit for potential health benefits due to their bioactive compounds (polyphenols, including anthocyanins and other flavonoids and ascorbic acid). Levels of bioactive compounds are influenced by ripening stage, genotype, cultivation techniques and climatic conditions during the pre- and postharvest period. The blueberry quality indices and nutritional properties are generally determined by colorimetric or chromatographic techniques (LC-MS, HPLC) that consume time and chemicals, and are laborious and expensive. In recent years, the development in multivariate statistical techniques (chemometrics) and instrumentation have focused increasing attention on rapid methods for predicting the concentration of specific chemical constituents. Mid and near infrared spectroscopy are rapid, non-invasive techniques, relatively inexpensive and require minimal sample processing before analysis. These techniques, combined with chemometric tools, can be used for qualitative and quantitative analysis of organic products. The aim of this work was to examine the potential of MIR and NIR spectroscopy to evaluate ripening indices and nutraceutical properties of two cultivar of blueberries ('Brigitta Blue' and 'Duke') grown in Valtellina (northern Italy) and harvested in 2005 and 2006, collected weekly from mature green to full ripe berries. Fruit from each ripeness class was analyzed using conventional methods for total soluble solids, total phenols, total flavonoids and total anthocyanins, ascorbate and by spectroscopic analysis, such as FT-IR and FT-NIR. The spectral data sets were correlated with technological ripening parameters and with nutraceutical compounds by using Partial Least Squares (PLS) regression algorithm. The PLS analysis for quantitative prediction of TSS gave a good calibration model in the near and mid infrared regions; also the calibration models developed in near and mid infrared regions were able to estimate the content of anthocyanins, polyphenols and flavonoids. On the whole, near and mid infrared spectroscopy gave promising results as they were rapid and non destructive methods to simultaneously evaluate technological ripening indexes and nutraceutical compounds of blueberries. These techniques could be valid and simple tools to reduce the analytical time and cost of monitoring blueberry quality.