Abstract

Identification of harvest date plays a key role in the agro-food chain as the quality of fruit depends on the right harvesting time and appropriate storage conditions during the postharvest period. Destructive techniques, such as the use of some ripening parameters, suffer from several drawbacks that highlight the need for reliable non-destructive tools to determine ripeness stage. This work is focused on the study of ripening of red apples ('Scarlet'), with the aim of better identifying the harvest date, by means of non-destructive analysis, through the characterization of each fruit ripening stage on the trees, with classical methods as a reference. UV–Vis analysis was applied in diffuse reflectance (DR) mode to monitor variations in the chlorophyll content of the skin of red apples during ripening on the tree, since the colour variation in red apples is difficult to observe during ripening, and the ground colour cannot be considered a valid tool to identify ripening. On the other hand, variation in the chlorophyll content, measured by means of in situ DR-UV–Vis spectroscopy, is a reliable indicator of the ripeness stage. The novelty of this work is that a backward interval–GA–partial least squares (PLS) model, based both on NIR and UV–Vis data, was used to predict the optimal harvesting time in a direct way. We also established an overview of fruit maturation through a comparison with UV–Vis analysis and calibrations of the ripening parameters.