Application of near-infrared spectroscopy and chemometrics for the rapid quality assessment of *Sargassum fusiforme*

Yue Yang, Haibin Tong, Liuchang Yang and Mingjiang Wu

Postharvest Biology and Technology, Volume 173, March 2021, 111431

Abstract

Edible marine algae, often referred to as sea vegetables, have attracted considerable attention as potential sources of nutrients and health-benefitting components. Quality assessment of sea vegetables is important for identifying commodity grades and ensuring nutritional and health effects. However, the conventional analytical methods to assess the quality of food are costly, time consuming, laborious, and destructive. Thus, in the present study, a simple, fast, and eco-friendly methodology of near-infrared (NIR) spectroscopy was investigated for its ability in the quality evaluation of a sea vegetable, namely, *Sargassum fusiforme*. To determine the contents of quality parameters (viz. mannitol, polysaccharide, fucosterol, and fucoxanthin) in *S. fusiforme*, a potential combined CARS-SVM model based on competitive adaptive reweighted sampling (CARS) and support vector machine (SVM) was proposed. The comparison between CARS-SVM and other partial least squares (PLS) models indicated that the wavelength selection method (CARS) and nonlinear regression tool (SVM) could significantly enhance model performance. Among the three types of calibration models (Full-PLS, CARS-PLS, CARS-SVM), CARS-SVM models obtained the best results in prediction of an independent test set. The coefficient of determination (R_p^2) and root mean square error (*RMSEP*) for the prediction set were 0.81 and 3.87 g kg^{-1} for mannitol, 0.86 and 15.94 g kg^{-1} for polysaccharide, 0.84 and 0.14 g kg^{-1} for fucosterol, and 0.78 and 1.76 × 10^{-2} g kg^{-1} for fucoxanthin. Overall, NIR spectroscopy coupled with CARS-SVM model was demonstrated to be a potential alternative to the quality assessment of *S. fusiforme*. These results could provide a valuable reference for the quality assessment of other sea vegetables, such as *Porphyratenera*, *Undariapinnatifida*, and *Laminaria japonica*.