

Identification of Apple Cultivars using Near-infrared Spectroscopy

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Near-infrared spectroscopy (NIRS) was used to investigate the possibility for application in identification of apple cultivars. Three apple cultivars 'Kamhong, Hwahong, and Fuji' produced in Korea were scanned over the range of 1100-2500nm using NIRS (InfraAlzer 500). Two types of samples were used for scanning; one was apple with skin and the other was apple without skin. For cultivar identification, the NIR absorbance spectrums were analyzed by qualitative calibration in "Sesame" analysis program, and the various influence properties such as sugar contents, acidity, color, firmness, and micro-structure were compared in scanned samples. The 'Kamhong' cultivar could be identified from 'Hwahong' and 'Fuji' cultivars using the cluster model analysis. The test samples in calibration between 'Kamhong' and 'Fuji' cultivars could be completely identified. The test samples in calibration between 'Kamhong' and 'Hwahong' cultivars could be identified most of all. But, 'Hwahong' and 'Fuji' cultivars could not be quite classified each other. The apple skin influenced the identification process of apple cultivars. The samples without skin were more difficult to classify in calibration than the samples with skin. The physicochemical properties of apple cultivars showed like the result of identification in calibration using NIRS. Some physicochemical properties of 'Kamhong' cultivar were different from those of the other cultivars. Those of 'Hwahong' and 'Fuji' cultivars showed similar to each other. The sucrose contents of 'Kamhong' cultivar were higher and the fructose contents and firmness of skin and flesh were lower than those of the others. The hypodermis layer of skin in 'Kamhong' cultivar was thinner than those of the others. In this studies, the identification of all apple cultivars by NIRS was not quite accurate because of the physicochemical properties which were different in the same cultivar, and inconsistent patterns by cultivars in some properties. To solve these problems in NIRS application for apple cultivar identification, further study should be focused on the use of peculiar properties among the apple cultivars.