Summary

A research supported by Illinois Department of Agriculture through the Specialty Crop Block Grant Program of USDA AMS studied the effect of pre and post-harvest treatments in strawberry fruits in their proteins. A class of proteins known as glycoproteins were found to be enriched during ripening of strawberries without post-harvest treatments.

The study also examined the ability of reflectance spectroscopy in predicting the mold growth in stored strawberries up to 3 days in advance. Similarly, the study was also able to show the prospect of reflectance spectroscopy in predicting days of storage, shelf-life, and sensory scores.

The findings from the research also supported the idea that refrigeration could slow the grey mold growth in strawberries and that the edible coatings could retain the fruit quality.

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For more information

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ILLINOIS

Illinois Department of Agriculture

SIU SPECIALTY CROP

Technologies to extend and monitor shelf life of strawberries

SIU SPECIALTY CROP GRANT
FRESH AND LOCAL PRODUCE

Reflectance spectroscopy for predicting shelf life of berries

Background

As a seasonal fruit having very short shelf-life, strawberry has high demand but limited availability. Low shelf-life of the fruits results in difficulties in harvesting and shipping which can add to huge losses. The shelf life extension measures such as use of edible coatings, oxygen absorbers, and cold-storage are known to considerably extended the shelf life of fruits. However the molecular mechanisms behind the shelf-life extension are largely unknown. The research conducted by SIU food safety research group show that glycoproteins may have important role in controlling fruit ripening.

The research also tested different machine learning methods for predicting the shelf-life, sensory ratings and mold development in strawberry using reflectance spectroscopy indicating prospect of application of optical sensors in fruit monitoring.

Results

The strawberries under refrigeration at 4°C were found to have enriched expression of a 100 kDa glycoprotein with increasing days of storage. The respiration rates of the strawberries were also examined for the deferent post-harvest treatment methods. Alginate coated strawberries were found to have significantly lower respiratory quotient (RQ) and rate of weight loss compared to strawberries stored with oxygen absorbers and without treatment.

The reflectance spectroscopy data indicated a potential to predict mold growth up to 3 days in advance at an accuracy rate of 83%. The prediction models built from UV-VIS near-infrared data were able to predict the sensory data with high accuracy (R^2= 0.92). The spoilage day could also be predicted with the UV-VIS-NIR model up to 4 days in advance.

The wavelength regions corresponding to water (1120 – 1200 nm, 1330 - 1420 nm, 1860 - 1870 nm) and redness (650—680 nm) were found to be more sensitive to the days of storage in strawberries. Similarly, the UV-VIS bands like 620 – 640 nm, 730-750 nm, and NIR bands 950 - 970 nm 1050 – 1180 nm, 1340 – 1380 nm, 1850 - 1880 nm, and 2150 -2180 nm were found to be more sensitive to mold growth in strawberries. Application of the selected few bands could achieve high accuracy in prediction- up to 89% accuracy in days of storage, and 80% accuracy in future mold prediction.

Further Information

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