**Inhibitory effect of antioxidant compounds on pink-rib discoloration in lettuce mid-ribs**

Catherine E. Belisle1\*, Bryce Askey2, Ru Dai1, Jeongim Kim1, Steven A. Sargent1, German V. Sandoya, and Jeffery K. Brecht1

1Horticultural Sciences Department, University of Florida IFAS, Gainesville, FL

2Agricultural and Biological Engineering Department, University of Florida, Gainesville, FL

Corresponding author: [sasa@ufl.edu](mailto:sasa@ufl.edu)

Lettuce (*Lactuca sativa* L.) is an economically important crop with a production value of $2.84 billion annually. Mid-rib discoloration is a stress disorder caused by enzymatic reactions leading to loss of quality and marketability. Phenylalanine ammonia lyase (PAL) and polyphenol oxidase (PPO) are the main enzymes involved in pink-rib and are activated upon wounding or stress. Previous reports have suggested antioxidant compounds as an option to inhibit or reverse discoloration. In this study, we induced wounding in store bought romaine and iceberg heads and submerged mid-rib sections in water, cysteine (500 ppm), and a nonpublic treatment (1000 ppm), as well as an additional control without wounding. Following 30 seconds of submersion, mid-ribs were pat dried and stored in breathable, high-density polyethylene bags at 5 °C/95% relative humidity for 5 d. Samples were evaluated for discoloration subjectively via visual inspection. A digital imaging method was also developed to provide an objective measure of pinking severity. In this method, pixel RGB values from digital images of the mid-ribs were measured to determine the percentage of pixels classified as pink at each cut site. Samples were then frozen in liquid nitrogen and processed for enzyme activity and metabolite analysis using spectrophotometry, high performance liquid chromatography (HPLC), and liquid chromatography mass spectrometry (LC-MS). In romaine lettuce, evaluation via visual inspection indicated that all treatments had minor to moderate pink-rib on the third day of storage. Pink-rib discoloration advanced to moderately severe in cysteine and the wounded control samples on day five. In iceberg lettuce, the nonpublic treatment had no sign of pink-rib discoloration by the fifth day, while cysteine and the wounded control resulted in moderate to moderately severe pink-rib on the third day. Over the course of treatment, the severity of discoloration measured by the digital imaging method matched that which was evaluated by visual inspection. This study showed the metabolites changes in the phenylpropanoid pathway, including an increase in PAL activity and metabolite formation after pink-rib discoloration was induced.

What are the results of the digital imaging method?

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