

## SUMMARY

A recent SIU study funded by the Specialty Crop Block Grant Program of USDA AMS through Illinois Department of Agriculture indicates shelf-life of berries can be significantly increased by edible coating of berries with natural antimicrobials.

The study examined the effect of limonene liposomes as edible nano-coatings on strawberry, blueberry, raspberry and blackberry. The freshness, visible mold and antioxidant were evaluated by sensory, microbial and chemical assay.

Edible nano-coatings can extend shelf-life of blueberries to 9 weeks, strawberry to 4 weeks, and both blackberries and raspberries by 2 weeks. Edible nano-coatings of berries are a natural means to extend shelf-life



Blueberries are one of the most abundant source of antioxidants. Blueberries can be stored in cooler for 9 weeks by edible coating treatment

## FOR MORE INFORMATION

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SIU SPECIALTY CROP RESEARCH

## EDIBLE COATING OF BERRIES

WITH  
NATURAL  
ANTIMICROBIALS  
FOR  
SHELF LIFE  
EXTENSION



SIU SPECIALTY  
CROP GRANT  
FRESH AND  
LOCAL  
PRODUCE

# EDIBLE COATINGS PREPARED FROM NATURAL ANTIMICROBIAL LIMONENE TO EXTEND SHELF LIFE OF BERRIES

## BACKGROUND

While the demand for berries is stable year round, the growing season is short and berries are highly susceptible to fungal spoilage, bacterial infection, and a short shelf life.

The SIU food safety research group developed a technology to coat local berries (strawberry, blueberry, raspberry, and blackberry) with edible coatings prepared from limonene, a natural phytochemical obtained from citrus peel. The coating material was prepared by encapsulating limonene in nano-liposomes made of lecithin, a natural lipid, obtained from soybean.

The antimicrobial efficacy of prepared coating material was examined in vitro by testing against bacteria and selected spoilage fungi. Freshness of coated and non-coated berries was measured by titratable acidity, soluble solids content, firmness, and weight loss at harvest and at regular intervals during storage.

## Results

Edible coating prepared from limonene liposome was found to extend shelf-life of strawberries by 4 weeks. The strawberries coated with limonene liposomes were shown to have lower respiration rates compared to control. Similarly, the strawberries coated with liposomes had significantly lower pH values (3.9) and higher anthocyanin contents (43.8).

The in vivo study of limonene liposome coating on blueberries revealed suppression of microbial growth and preservation of freshness even after 9 weeks of storage at 4 °C. The antibacterial activity against *E.coli* and *Listeria* showed 1.7-log and 3.4-log reductions within 48 h. Germination of *Botrytis cinerea* conidia was completely suppressed over 48 h. Edible coating reduced weight loss, as well as showed significantly lower mold deterioration, and higher firmness throughout storage.

Limonene nano-coating reduced physical fruit loss and suppressed mold and bacterial growth of raspberries. Further the coating reduced color change and weight loss



Local berries are rich in flavor and polyphenol antioxidants

throughout storage. The coated raspberries also retained higher polyphenols compared to uncoated. The coating did not significantly affect firmness, titratable acidity, pH, and soluble solid of raspberries. Shelf-life of raspberries was extended to 2 weeks more than uncoated.

Blackberries coated with limonene liposomes exhibited lower weight loss and microbial growth. Freshness and shelf-life of blackberries were extended over 2 weeks compared to the uncoated blackberries. The alginate coated blackberries had lower weight loss and respiration compared to the limonene liposomes. However the mold and bacteria growth were more suppressed in limonene coating.

## FURTHER INFORMATION

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