

Introduction

Blueberries (*Vaccinium corymbosum*) are known to contain high levels of antioxidants, a class of compounds that can prevent damage to cells caused by free radicals in the body. Incorporating blueberries into one's diet is a natural strategy to boost antioxidant intake and promote overall health. In fact, eating one cup of wild blueberries will provide about 13,000 total antioxidants, which is 10 times the USDA's recommendation.

However, the quality of blueberries deteriorates quickly during storage and the antioxidant content declines. In order to extend the shelf-life and preserve the levels of antioxidants in blueberries, dry lavender flower and essential oil were used in the treatments of this study to test their antimicrobial properties and potential to extend blueberry's shelf-life.

The DPPH test, a widely utilized method for assessing antioxidant activity, was used to determine the antioxidant capacity of the blueberries. By measuring the inhibition of free radicals through this method, we were able to gauge the effectiveness of different storage conditions in preserving the antioxidant content of blueberries over time.

Materials and Methods

Fresh blueberries were obtained from a local grocery store and treated with several storage conditions: 1) Control capped/uncapped; 2) Towel capped/uncapped; 3) Lavender flower capped/uncapped; 4) Lavender oil capped/uncapped. The blueberries were stored in ambient conditions for two weeks.

Every week, the diameter, the pH and weight of blueberries were recorded. After two weeks, blueberry tissue was extracted in 100% methanol for every treatment. 0.3 mL of extract was mixed with 3.0 mL of 2,2-diphenyl-1-picrylhydrazyl (DPPH) solution (diluted with 100% methanol). The absorbance of the mixture was recorded using a spectrophotometer at 517 nm against the blank (100% methanol), after a 30 minute period of dark incubation. Percent (%) of inhibition of free radicals is expressed as $(\text{absorbance of blank} - \text{absorbance of sample}) / \text{absorbance of blank} * 100\%$



Results

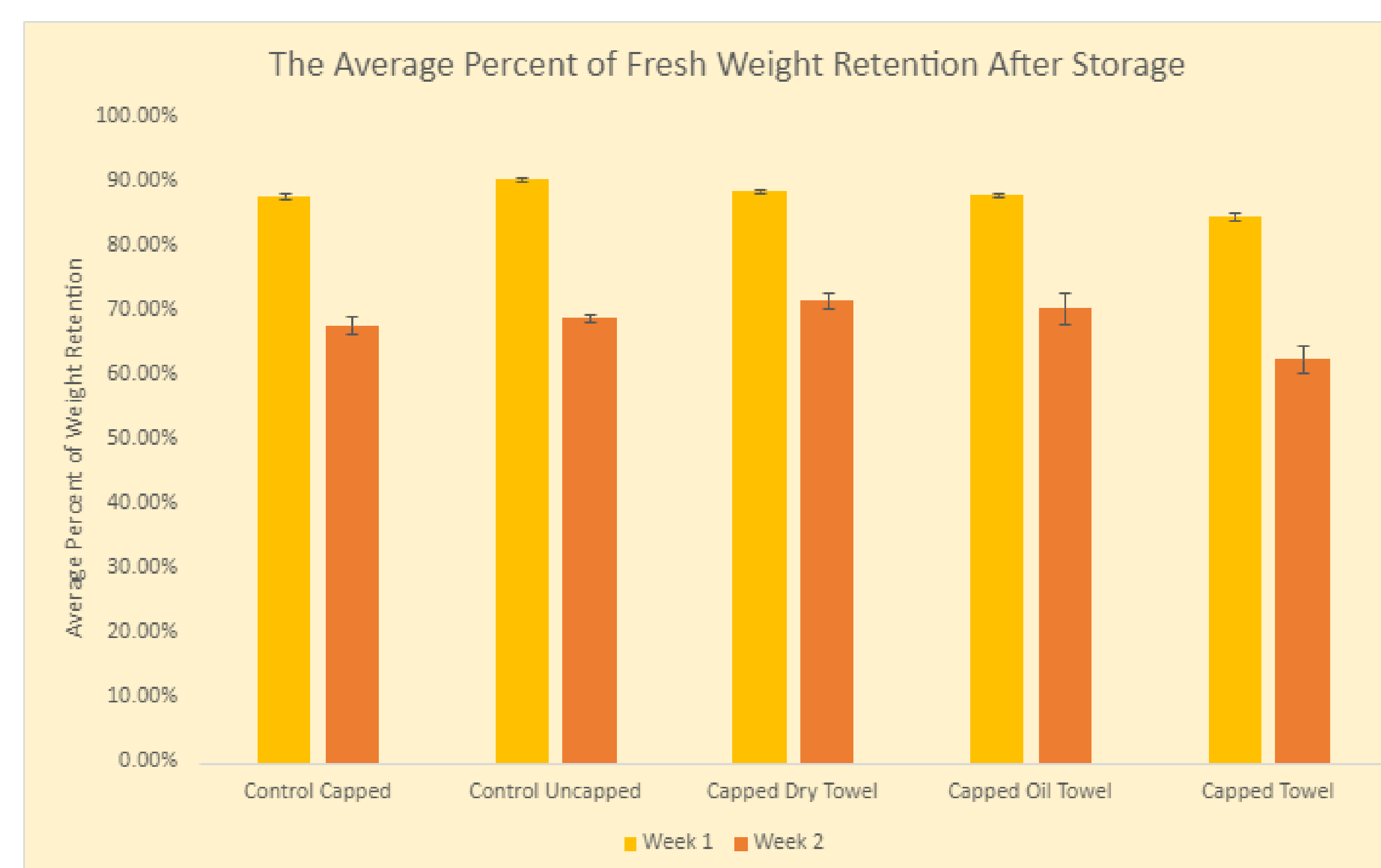


Fig 1. The Average Percent of Fresh Weight Retention After Each Week

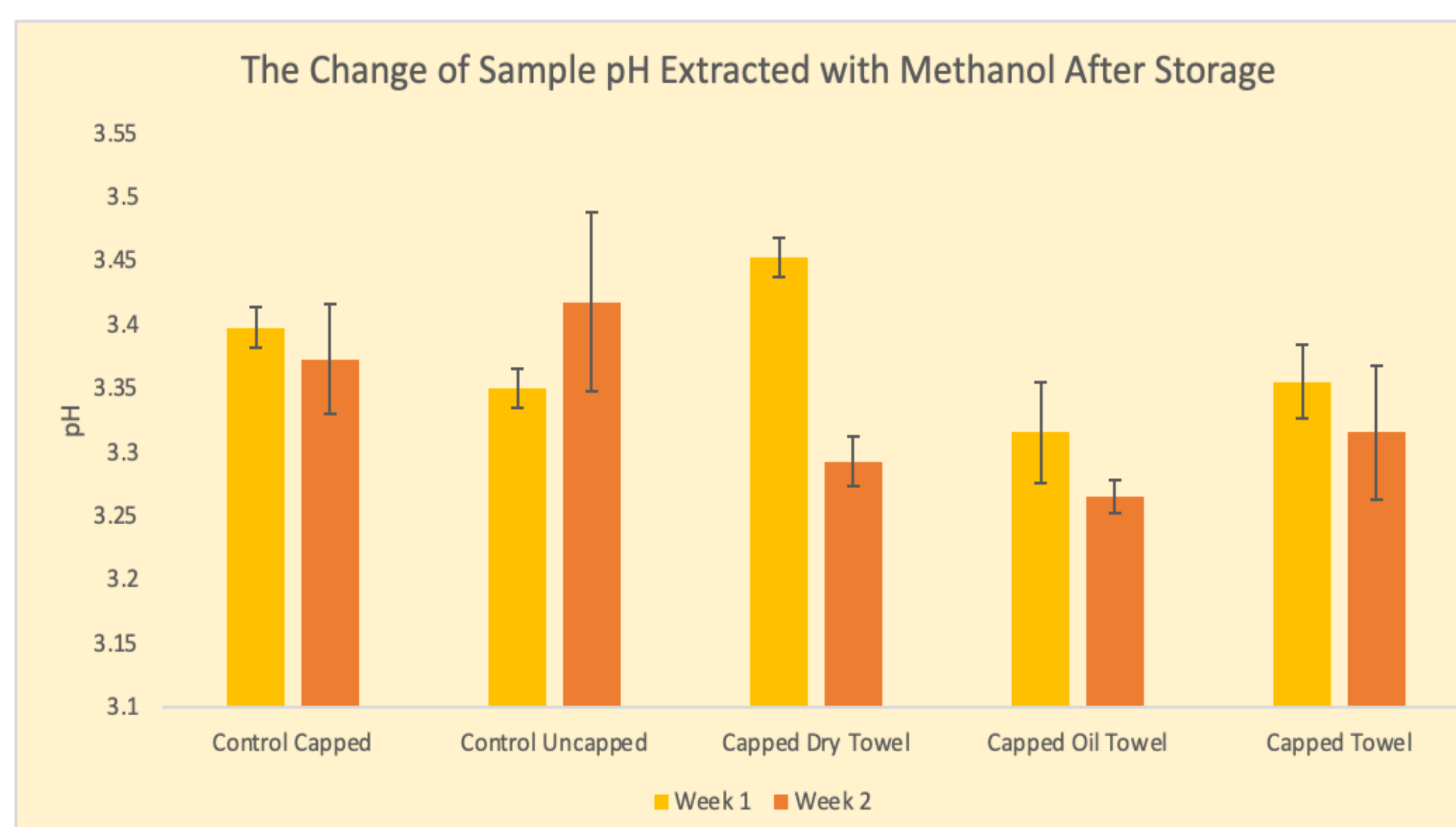


Fig 2. The Change of Sample pH Extracted with Methanol After Each Week

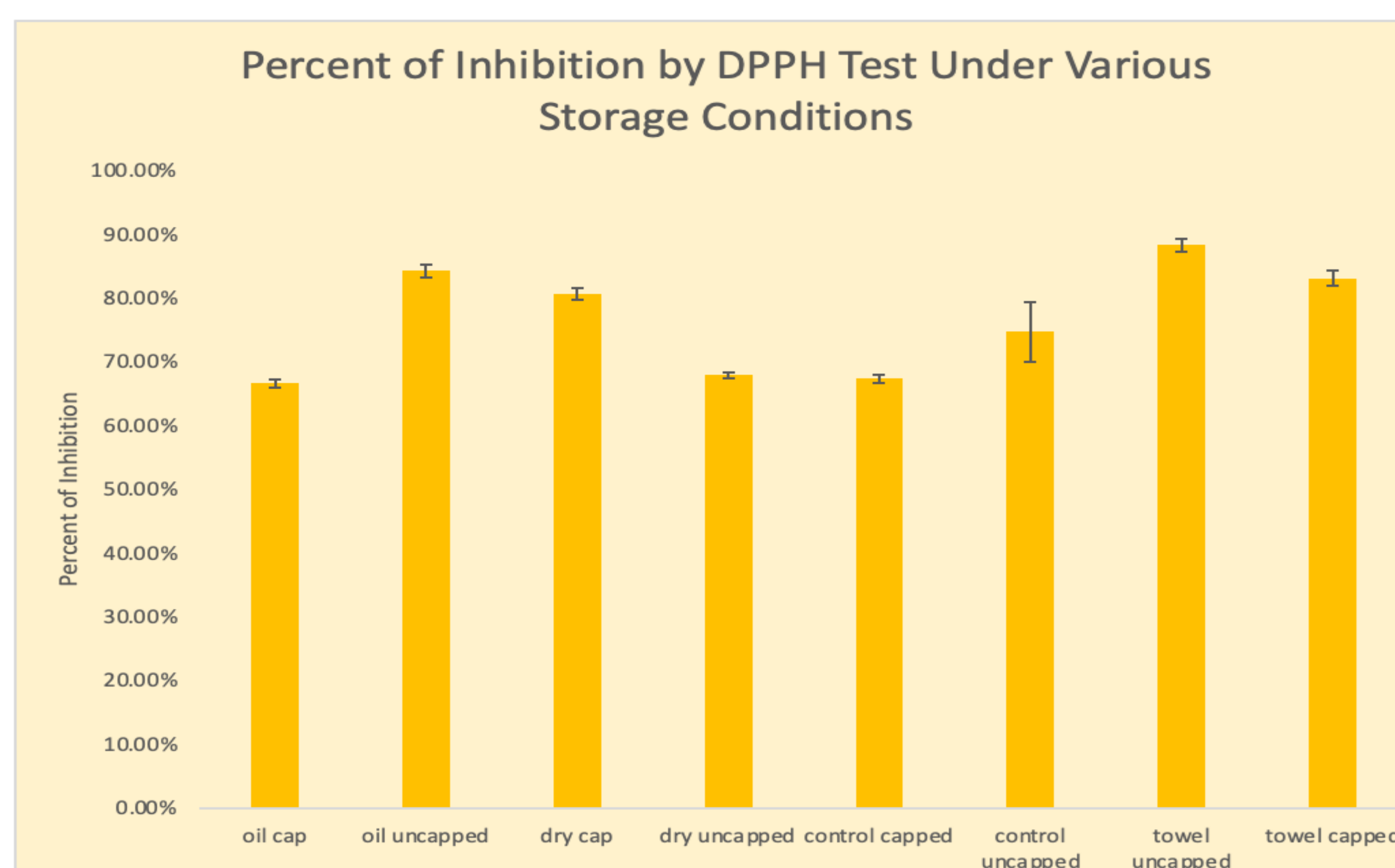


Fig 3. Percent of Inhibition by DPPH Solution Under Various Treatments

Discussion

- A decrease in blueberry weight over time was observed (Fig 1.). After the first week, the control-uncapped retained the most of its original weight. However, after 2 weeks, the cap-dry-towel retained the most weight.
- Over two weeks all trials became more acidic with the exception of the control-uncapped which remained unchanged (Fig. 2).
- The blueberry trial stored with paper towel in an uncapped container retained the highest antioxidant capacity with an average inhibition on free radicals by 88.33% (Fig. 3).
- The trial with the lowest antioxidant capacity was stored with lavender oil in a capped container with an average inhibition on free radicals by 66.63% (Fig. 3).
- While our data supports the notion that the uncapped towel trial retained the most antioxidant, there might be more qualities of the blueberry that need to be taken into account, such as color, texture, etc. A blueberry that is mushy and discolored is not appetizing regardless of its antioxidant content.

Conclusion and Future Work

- From these findings we can conclude that the quality of blueberry deteriorated differently under various storage conditions. It was determined that a simple paper towel retained blueberry integrity the best. This poses a cost effective and simple strategy to extend shelf life.
- Further research must be done in order to optimize all the qualities of the blueberries. Future work can also include additional storage factors (e.g. temperature, light exposure) to see if an optimal condition to store blueberries can be identified.
- While our pre-tests did not show a significant difference in antioxidant retention using varying levels of lavender oil and flower, other herbal materials can be tested as alternative natural preservatives.
- Food waste is a huge problem in the United States, so research that can potential find methods to extend shelf life is crucial to the sustainability of our food systems.

Acknowledgments

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