U.S. Department of Agriculture
Work Unit Description AD-416
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1. Accession No.	Agency Identifiers		5. Work Unit/Project No.	6. Status
	2. NIFA	3. LA.B	LAB94124	A = New Project

7. Title
Quality and Safety of Fresh-cut Vegetables and Fruits

8. Performing Organization 1120 - 2010
Food Science
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution

10. Multistate Project No. S294

11. Cooperating States

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Hatch/Multistate			

18. Award Date (Month/Day/Year)	19. Start Date (Month/Day/Year)	20. Termination Date (Month/Day/Year)
	10/01/2011	09/30/2016

Goals/Objectives/Expected Outputs

Objectives: 1. Evaluate methods of sampling and measuring flavor and nutrition of fresh-cut products to facilitate comparison to traditional shelf life factors. 2. Develop new strategies to improve and better maintain inherent fresh-cut product quality and nutrition. Expected Outputs: 1. Standard procedure for measuring sensory quality of coated fresh-cut fruits and vegetables will be developed. Particulary, sensory discrimination in conjunction with signal detection theory (the R-Index method) will be developed. 2. Novel antimicrobial edible coating, particularly from chitosan, to better maintain physicochemical and sensory quality of fresh-cut fruits and vegetables, will be identified or developed. 3. Findings will be disseminated at scientific conferences and published in journals such as Journal of Food Science, International Journal of Food Science and Technology, LWT-Food Science and Technology.

Methods

Methods 1. Preparation of chitosan-coating solutions and fresh-cut fruits and vegetables. Chitosans with different molecular weights will be used. Chitosan-coating solutions will be prepared by dissolving chitosan in weak organic acid. The solutions will then be adjusted to pH 5.6 and kept refrigerated before being applied on fresh-cut samples. Various fruits and vegetables will be used. For instance, sweet potatoes will be washed, peeled, mechanically cut into uniform cubes (FCSP). FCSP will be then dipped in the chitosan-coating solution for 2 min, drained for 5 min, and stored in sealed plastic bags at 4C for up to 17 days. 2. Quality Characterization. Color measurements will be conducted using a portable spectrophotometer and results are expressed as L* lightness, a* (-a* = greenness, +a* = redness), b* (-b* = blueness, +b* = yellowness), and hue angle. Texture firmness will be measured, and results will be reported as the peak compressive force in Newton (N). Weight loss (%) during storage will be calculated as [(weight of sample at Day 0 - weight of sample during storage)*100]/ weight of sample at Day 0. Based on the results of color, texture, and weight loss, the coating treatment that best maintains physical quality of fresh-cut samples will be selected for further microbial and sensory studies. Microbial analysis. Uncoated and chitosan-coated fresh-cut samples will be analyzed for total aerobic plate (TPC) and yeast & mold counts. The colonies will be visually counted regardless of size or intensity after incubation and results expressed as log10 CFU/g. Sensory discrimination test. Uncoated sample at day 0 (UCD0, the labeled standard or noise) will be freshly prepared and used to compare with the unlabeled signal samples, consisting of unknown UCD0 and unknown coated samples. The unlabeled standard also will be presented to ascertain the "noise" level. Consumers (N = 100) will evaluate these samples. The unknown UCD0 and unknown coated samples will be individually compared to the labeled UCD0 for specified attributes. The R-index calculation will be conducted and expressed as % sensory discrimination. 3. Data will be analyzed

using statistical analysis software. Analysis of variances will be used to determine differences among the uncoated and chitosan-coated FCSP. If significances among the samples are found, the Tukey studentized range test will be performed for post-hoc multiple comparisons. The project evaluation plan. 1. To verify that the R-Index method is a valid method for evaluating sensory differences of chitosan-coated fresh-cut fruits and vegetables. 2. To confirm that chitosan as an antimicrobial edible coating can be used to maintain the physicochemical and sensory quality of fresh-cut fruits and vegetables during storage; thus extending their shelf life.

23. Non-Technical Summary

Consumer demand for fresh-cut produce has drastically increased recently due to changes in their lifestyle and health consciousness. Minimal processing provides convenience and wastage reduction to consumers and adds value to the fresh produce. However, the minimal processing causes wounded viable tissues of fresh produce which leads to tissue softening, discoloration and increasing microbial spoilage that will shorten the shelf-life of the produce. To preserve quality and extend shelf-life, coatings or edible films can be applied to the fresh produce to prevent moisture loss, control respiration activity, and inhibit loss of natural volatile flavors and colors. Chitosan, a natural carbohydrate biopolymer, has been widely used as coating materials for fresh produce because of its film-forming property and inherent antimicrobial functions. In this proposed research, chitosan will be utilized to produce antimicrobial edible coating which can be applied on fresh-cut fruits and vegetables in order to prolong their shelf life. The information from this study will help the processor meet the consumer and market demand on fresh-cut fruits and vegetables such as fresh-cut sweet-potato cubes.

24. Keywords

Fresh cut fruits; Fresh cut vegetables; Chitosan; Chitosan Coating; Shelf life; Physicochemical properties; Sensory discrimination; Sweet potato; The R index method

****** The Original signed document is on file at this institution. ******

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