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1. Accession 0208935	Agency Identification No. 2. CSREES 3. TEX	5. Work Unit/Project No. TEX07029
7. Title Postharvest Quality and Safety in Fresh-cut Vegetables and Fruits		6. Status Annual Report
12. Investigator Name(s) (Last Name and Initials) Castillo, A.		
20. Termination Date 09/30/2010		40. Period Covered (mo/da/year): 01/01/2007 TO 12/31/2007
Outputs:		
<p><b>Spinach disinfection.</b> The effect of different sanitizers on the reduction of <i>Escherichia coli</i> O157:H7 and <i>Salmonella</i> on baby spinach leaves was studied. Fresh spinach was obtained directly from growers and transported to the Food Microbiology Laboratory at Texas A&amp;M. Spinach leaves were inoculated with <i>E. coli</i> O157:H7 and <i>Salmonella</i> Agona, Gaminara, Michigan, Montevideo, Poona and Typhimurium. Inoculated spinach leaves were subjected to a water wash followed by treatment of one of the following sanitizers: 2% lactic acid at 55 C, calcium hypochlorite, peroxyacetic acid, ozonated water, or chlorine gas. The reductions of <i>E. coli</i> O157:H7 and <i>Salmonella</i> on spinach leaves were similar to each other and the sanitizers had an average log reduction of 1.1 CFU/g. The treatment that produced the greatest bacterial reduction was lactic acid. This treatment significantly reduced <i>E. coli</i> O157:H7 by 2.7 and <i>Salmonella</i> by 2.3 log cycles. If used as part of a holistic approach for food safety which includes good agricultural practices as well as good manufacturing practices, the use of a disinfection treatment may contribute to the overall safety of fresh spinach.</p> <p><b>Irradiation of spinach.</b> The reduction of inoculated <i>E. coli</i> O157:H7 and <i>Salmonella</i> on baby spinach by the application of e-beam irradiation was tested in this study. Fresh spinach was inoculated with a bacterial cocktail containing rifampicin resistant (Rif+) <i>E. coli</i> O157:H7 and Rif+ <i>Salmonella</i> Agona, Gaminara, Michigan, Montevideo, Poona and Typhimurium. Inoculated samples as well as controls were exposed to 0.79, 1.16 or 2.48 kGy electron beam irradiation from a linear accelerator. Reductions in populations were determined by plate counting. Irradiated spinach was also stored for 8 days at 4 C and counting was done at 2-day intervals to determine if there was any effect of irradiation on the survival of both pathogens. For <i>E. coli</i> O157:H7, the log reduction was 4.1, 6.3 and 6.4 log CFU/g when irradiated at 0.79, 1.16 and 2.48 kGy, respectively. For <i>Salmonella</i>, the log reduction was 4.0 at 0.79 kGy. For samples irradiated at 1.16 or 2.48 kGy, initial counts of 7.3 log CFU/g were reduced to below the detection limits (&lt; 10 CFU/g). Irradiation did not affect the survival of the remaining microorganisms stored over eight days (P &lt; 0.05). These results suggest that electron beam irradiation may be a viable tool for reducing microbial populations or eliminating <i>E. coli</i> O157:H7 and <i>Salmonella</i> from fresh bagged spinach. We have been working with the Wintergarden Spinach Producers Board and the Texas Produce Association.</p>		
Outcomes/Impacts:		
<p>Knowledge generated from this study is being used in teaching activities for a change in attitude among students towards food safety in general and food irradiation for food safety purposes. In addition, we have been working with professional groups in promoting electron beam irradiation as an environment-friendly, safe alternative for improving food safety without damaging food products, especially fresh and fresh-cut fruits and vegetables.</p>		
Publications:		
<p>Neal, J., Maxim, J., Castillo, A. 2007. Reduction of <i>Escherichia coli</i> O157:H7 and <i>Salmonella</i> Species on Baby Spinach Using Electron Beam Irradiation. IAFP Program and Abstract Book Annual Meeting. Orlando, FL. T2-03</p>		
Participants:		
<p>Alejandro Castillo (Project Director) Jay Neal (Ph D student) Joe Maxim (collaborator) Wintergarden Spinach Producers Board</p>		
Target Audiences:		
<p>Students Professional Associations such as the International Association for Food Protection Wintergarden Spinach Producers Board</p>		
Project Modifications:		
<p>None Reported</p>		
Approved (Signature)	Title	Date