**APPENDIX D**

# SAES-422

# Project Number: S294

# Project Title: QUALITY AND SAFETY OF FRESH-CUT VEGETABLES AND FRUITS

# Period Covered: 10/01/2014 to 09/30/2015

**Date of This Report: 01/24/2016**

**Annual Meeting Date: 06/09/2015**

**Participants:**

Almenar, Eva (ealmenar@msu.edu) – MI;

Bach, Susan (Susan.Bach@agr.gc.ca) – AAFC-BC;

Brecht, Jeff (jkbrecht@ufl.edu) – FL;

Cantwell, Marita (micantwell@ucdavis.edu) – CA;

Saltveit, Mikal (mesaltveit@ucdavis.edu); CA

Shaw, Angela (angelaml@iastate.edu) – IA;

**Reports were also submitted by/for non-attending participants:**

Baldwin, Elizabeth (Liz.Baldwin@ars.usda.gov), Bai, Jinhe (Jinhe.Bai@ars.usda.gov), Plotto, Anne (Anne.Plotto@ars.usda.gov) – ARS-FL;

Barrett, Diane (dmbarrett@ucdavis.edu), Mitcham, Elizabeth (ejmitcham@ucdavis.edu), Suslow, Trevor (tvsuslow@ucdavis.edu) – CA;

Bartz, Jerry (jabartz@ufl.edu), Danyluk, Michelle (mddanyluk@ufl.edu), Goodrich, Renee (goodrich@ufl.edu), Huber, Don (djhuber@ufl.edu), Sargent, Steven (sasa@ufl.edu), Schneider, Keith (keiths29@ufl.edu), Simonne, Amy (asim@ufl.edu), Sims, Charles (csims@ufl.edu) – FL;

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Delaquis, Pascal (Pascal.Delaquis@agr.gc.ca) – BC;

Doyle, Michael (mdoyle@uga.edu) – GA;

Forney, Charles (Charles.Forney@agr.gc.ca), Fan, Lihua (Lihua.Fan@agr.gc.ca) – AAFC-NS;

Hurst, William (bhurst@uga.edu) – GA (including Doyle);

Koo, Jaheon (kooj@uapb.edu) – AR (including Wright);

Nannapaneni, Rama (nannapaneni@fsnhp.msstate.edu) – MS;

**Minutes of the annual meeting:**

1. Welcome and Introduction (Chair: Susan Bach)
	1. Meeting called to order at 10:00AM. Welcome by the Chair, along with a roundtable introduction. McCormick Place Convention Center, Chicago, IL (United Fresh Convention)
	2. Officers:
		1. Past chair: Eva Almenar, MI
		2. Chair: Susan Bach, BC (absent)
		3. Vice chair Angela Shaw, IA
		4. Secretary: Jeff Brecht, FL (absent)
	3. Administrative Advisor: Reuben Moore, Mississippi State University
2. Approval of 2015 Meeting agenda
3. Approval of 2014 minutes
4. Report from the Administrative Advisor, Rueben Moore.
	1. Distributed review of the S294 application for the Southern Region Excellence in Multistate Research Award
	2. Discussion on how to write future applications to improve award chances
5. Station Reports.

Each station provided a brief summary of what they have accomplished, followed by discussion

1. New Business
	1. Discuss communication methods
		1. Agreement that email is best method and repeated emails are okay
		2. Continual communication throughout the year
	2. Discussion of improved collaboration with United Fresh via the Food Safety & TechnologyCouncil; to be followed up on at this year's FSTC meeting.
		1. Follow up email will be sent in August to start the discussion.
		2. Goal is to have a list to UFPA by December 2015
	3. Improve attendance at S294 Meetings
		1. Discussion on web based method for those who cannot attend
	4. Election of new Secretary for 2015-17
		1. Jeff Brecht was elected
2. Adjourn. Meeting was adjourned at 12:30pm

**Accomplishments:**

The S294 group interacted with the United Fresh Food Safety & Technology Council (FSTC; <http://www.unitedfresh.org/food-safety/food-safety-technology-council/>). The FSTC is an about 125-member group made up of company decision-makers and R&D folks, including a few S294 members. We participated in their June 8 meeting by introducing the S294 institutions, participants, and research expertise areas in the morning, and having a session on identifying the industry’s research interests and priorities in the afternoon. There was interest expressed by FSTC in finding out what is known about the relationship between shelf-life of fresh-cut vegetables and fruits and growth of spoilage microorganisms and human pathogens (including effects of environmental and other factors like sanitizers, temperature and MAP). We agreed at our project meeting on June 9 to propose to United that we write a white paper on the topic that would be published by the association. We also agreed to reach out to the S1056 Multi-State project (Enhancing Microbial Food Safety by Risk Analysis) to partner with us. David Gombas from United is currently following up with the FSTC members to compile a more complete list of research interests for us and also gauging how much interest there is in the white paper idea.

**Objective 1. Evaluate methods of sampling and measuring flavor and nutrition of fresh-cut products to facilitate comparison to traditional shelf life**

Baldwin, Bai & Plotto (ARS-FL) Identification of strawberry varieties from breeding lines with enhanced flavor characteristics.

**Objective 2. Develop new strategies to improve and better maintain inherent fresh-cut product quality and nutrition.**

Barrett (CA) Studied the effects of cultivar and ripeness on fresh-cut mango instrumental and sensory qualities; calcium salts application on texture and sensory qualities.

Brecht, Huber & Sargent (FL) Infusion of fresh-cut strawberries with PME + calcium maintains 4-fold greater firmness during storage. Ackee arils stored at 5C versus 10C develop chilling injury-related tissue watersoaking. Pink tomatoes show reduced aroma volatiles at less than 15C; MA extends shelf life (slows ripening) at ≥15C, but also reduces aroma volatile production.

Baldwin, Bai & Plotto (ARS-FL) Edible coatings for zucchinis, destined as fresh-cut ready to eat or cooked product, extended shelf life, appearance, texture and flavor. Development of new clamshells with smaller openings that result in higher relative humidity, less weight loss and improved quality for small fruits.

Shaw (IA) Evaluation of produce sanitizers to improve shelf life and quality of melons.

Almenar (MI) Development of new bio-based materials for food packaging applications. Evaluation of possibilities for food applications of laboratory developed and commercially available bio-based packaging materials. Found interactions between in-package gas compositions and sanitizers that affect safety and quality of fresh-cut produce. Development and validation of a new packaging systems made from natural resources for fresh produce.

Forney (NS) Market life of new red raspberry cultivars with superior postharvest quality can be further extended by atmosphere modification. Forney & Fan (NS) Improved process were developed for value-added fruit and vegetable products.

**Objective 3. Improve understanding of physiological mechanisms that affect fresh-cut product quality.**

Huber and Sargent (FL) Characterized programmed cell death (PCD) in ethylene-treated cucumber fruit and showed that increases of PCD-related proteases and nucleases precede loss of cell integrity and watersoaking.

Baldwin, Bai & Plotto (ARS-FL) Use of pre-chilling heat treatments on green tomatoes to reduce chilling-induce flavor loss.

**Objective 4. Determine critical factors in controlled inoculation studies with human pathogens and surrogates that influence the outcome of quantitative microbial risk assessments.**

Danyluk (FL) Advanced ripeness and bruising do not generally increase the risk from E. coli O157:117 and Salmonella for properly handled strawberries and blueberries.

Erickson (GA) Studying the surface contamination and internalization of pathogens in leafy greens due to fertilizing with manure or other types of compost can improve practices followed by organic growers.

Shaw (IA) Evaluation of produce sanitizers to determine most effective against E.coli O157:H7, non-O157 STEC, Salmonella, and Listeria monocytogenes. Ability of grape seed extract to control Listeria monocytogenes in wheatgrass juice.

Nannapaneni (MS) Acid stress adaptation when induced at 37°C in Listeria monocytogenes is stable at 4°C for 24 h and at 37°C or 22°C for 2 h. Immediately upon induction, acid stress adaptation also induced cross protection in Listeria monocytogenes against lauric arginate inactivation. Acid adaptation induced cross protection against lauric arginate is reversible within 1 h at 4°C.

**Objective 5. Evaluate and control unintentional and intentional microbial contamination of intact and fresh-cut produce.**

Wright & Koo (AR) Application of antimicrobial wash to control Listeria monocytogenes, Salmonella typhimurium, and Escherichia coli O157:H7 on fresh cantaloupe.

Bach & Delaquis (BC) Increased knowledge pertaining to the survival of Salmonella enterica in mixed ingredient salads. Increased knowledge pertaining to the effects of stress on the survival of VTEC on fresh-cut lettuce

Schneider (FL) A square root model was developed for growth of Listeria monocytogenes on fresh-cut cantaloupe, honeydew and watermelon, which can be used in subsequent quantitative microbial risk assessments.

Mendonca (IA) Electron beam radiation resistance and injury in starved Escherichia coli O157:H7.

Doyle et al. (GA) Increased risk-based environmental and product testing by the food industry, and the proper diagnosis and reporting of cases by medical clinicians, can reduce foodborne outbreaks.

Fan (NS) Isolated and identified heat-resistant fungi from frozen blueberry and improved heat treatment strategies were determined. Provided useful information on preventing losses due to spoilage caused by the heat-resistant fungi.

**Short-term Outcomes:** Project participants developed multiple guidance and training tools for growers, fresh-cut processors, and retailers.

Research topics identified through interaction with the United Fresh FSTC were:

* Quality: sensory attributes and shelf life; nutritional value of our products (methodology); library of conditions (growing conditions) that cause sensory attributes (color, density, leaf structure, flavor; survey development) (leafy greens)
* Consumer behavior
* Safety: direct product contact; irrigation water in Mexico (90,000 E.coli coliform); flood irrigation: mitigating steps work (pruning 24 inch up; wire; chlorinate without a huge irrigation system; q pipe that can blend); blackberries; raspberries; cane berry (pathogen reduction on the product)
* Repack and storage environment; water and mold is introduced (best practices for sanitation and micro); don’t wash items (prevalence study)
* Conventional flume [increase free chlorine related to safe harbor; how does that affect nutrition, sensory attributes (texture, color flavor) with fresh cuts]; secondary effects of chlorine levels
* Validate ongoing measurements within field to fork (preventive controls)/ separate chain

**Outputs:**

**Publications.**

Ali, A., M.K. Ong, and C.F. Forney. Effect of ozone pre-conditioning on quality and antioxidant capacity of papaya fruit during ambient storage. Food Chem. 2014. 142:19-26.

Bai, J., Baldwin, E., Hearn, J., Diggers, R. and Stover, E. Volatile profile comparison of USDA sweet-orange-like hybrids vs. ‘Hamlin’ and ‘Ambersweet. HortScience 49:1-6. 2014

Bai, J., Baldwin, E.A., Plotto, A., Narciso, J.A., Sun, X., Wang, L., Wang, Z., and Seavert, C. New clamshells to decrease moisture loss and extend storage life of small fruits. Proc. Fla. State Hort. Soc. 2014 (in press)

Barros, M., M.E. Saltveit. Microbial growth in fresh-cut lettuce increases when wound-induced phenolic accumulation is suppressed. Postharvest Biology and Technology 83:34–39. 2013

Bartz, J.A., Yuk, H.G., Mahovic, M.J., Warren, B.R., Sreedharan, A., and Schneider, K.R. Internalization of Salmonella enterica by tomato fruit. Food Control (in press)

Berry, E.D. J. E. Wells, J. L. Bono, B. L. Woodbury, N. Kalchayanand, K. N. Norman, T. V. Suslow, G. López-V., P. D. Millner. Effect of proximity to a cattle feedlot on Escherichia coli O157:H7 contamination of leafy greens and evaluation of the potential for airborne transmission. Applied and Environmental Microbiology 81(3). DOI:10.1128/AEM.02998-14 2014

Bisha, B., J.A. Adkins, J.C. Jokerst, J.C. Chandler, A. Pérez-Méndez, S.M. Coleman, A.O. Sbodio, T.V. Suslow, M.D. Danyluk, C.S. Henry, L.D. Goodridge.  Colorimetric paper-based detection of Escherichia coli, Salmonella spp., and Listeria monocytogenes from large volumes of agricultural water.  J. Vis. Exp. (88), e51414, doi:10.3791/51414. 2014

Blaker, K., Plotto, A., Baldwin, E. and Olmstead, J. Correlation between sensory and instrumental measurements of soft and crisp textured southern highbush blueberries. J. Sci. Food Agric. 94:2785-2793. 2014

Blanco-Diaz, M.T., Plotto, A., Bai, J. Narciso, J. Font R., Baldwin, E.A. Effect of edible coatings to preserve physico-chemical and sensory quality for fresh and cooked zucchini products. Proc. Fla. State Hort. Soc. 2014 (in press)

Bouzari, A., D. Holstege and D.M. Barrett. Mineral, fiber, and total phenolic retention in eight fruits and vegetables: A comparison of refrigerated and frozen storage. Journal of Agricultural and Food Chemistry 63(3):951–956. 2015

Bouzari, A., D. Holstege and D.M. Barrett. Vitamin retention in eight fruits and vegetables: A comparison of refrigerated and frozen storage. Journal of Agricultural and Food Chemistry 63(3):957–962. 2015

Bovo, F., de Cesare, A., Manfreda, G., Bach, S.J., and Delaquis, P.J. Fate of Salmonella enterica spp. in mixed ingredient salads containing lettuce, chicken meat and cheese. Journal of Food Protection 201 (in press)

Buccheri, M. and M. Cantwell. Damage to intact fruit affects quality of slices from ripened tomatoes. LWT-Food Science and Tech., 59:327-334. 2014

Cantwell, M. (ed. compiler) (19th ed.). Fresh-cut Products: Maintaining Quality and Safety. Univ. California Postharvest Horticulture Series No. 10. (updated for UC Davis Fresh-cut workshop, Sept 23-25, 2014. http:postharvest.ucdavis.edu/bookstore/Fresh-cut\_Workshop\_Binder\_and\_Portfolio/ 2014

Chandra, V., M. Torres, and Y. R. Ortega. Efficacy of wash solutions in recovering Cyclospora cayetanensis, Cryptosporidium parvum, and Toxoplasma gondii from basil. Journal of Food Protection. 2014. 77 (8): 1348–1354

Chen, D. T. Zhao, M. P. Doyle. Single- and mixed-species biofilm formation by Escherichia coli O157:H7 and Salmonella, and their sensitivity to levulinic acid plus sodium dodecyl sulfate. Food Control. 2015. 57: 48-53.

Chen, D. T. Zhao, M. P. Doyle. Control of pathogens in biofilms on the surface of stainless steel by levulinic acid plus sodium dodecyl sulfate. Accepted manuscript to International Journal of Food Microbiology 2015 "10.1016/j.ij foodmicro.2015.04.026."

Chintagari, S., Y.-C. Hung, D. Hamanaka. Resistance of various STEC strains and serogroups to UV radiation and effect of nalidixic acid adaptation Food Control. 2015. 50: 313-319

Danyluk, M.D., Friedrich, L.M., and Schaffner, D.W. Modeling the growth of Listeria monocytogenes on cut cantaloupe, honeydew and watermelon. Food Microbiol. 2014. 38: 52-55

Delaquis, P.J. and Bach, S.J. Modelling as an approach to identify and manage food safety risks related to parasites in the food chain In. Foodborne parasites in the food supply web: Occurrence and control. Gajadhar, A. (ed.) - Woodhead Publishing Ltd. 2014 (in press)

Deltsidis, A.I., E.A. Baldwin, J. Bai, and J.K. Brecht. Tomato chilling injury threshold defined by the volatile profiles of pink harvested tomato fruit. Acta Hort. in press

Deltsidis A.I., E.D. Pliakoni, E.A. Baldwin, J. Bai, A. Plotto, and J.K. Brecht. Tomato flavor changes at chilling and non-chilling temperatures as influenced by controlled atmospheres. Acta Hort. 2015. 1071: 703-709

Dong, X., Huber, D.J., Ramirez-Sanchez, M., Rao, J., Lee, J., Watkins, C.B. Cultivar differences in gaseous 1-methylcyclopropene accumulation in whole and fresh-cut apple fruit. Postharvest Biol. Technol. 2014. 93: 130-134

Doyle, M.P., M.C. Erickson, W. Alali, J. Cannon, X. Deng, Y. Ortega, M.A. Smith, and T. Zhao. The food industry's current and future role in preventing microbial foodborne illness within the United States. Clinical Infectious Diseases. 2015. "advance access DOI: 10.1093/cid/civ253"

Du, X., Song, M., Baldwin, E., Rouseff, R. 2014 Identification of sulphur volátiles in two fresh tomato cultivars and GC-olfactometry aroma profiling. Food Chem. (accepted 9/5/14). 2014 (in press)

Erickson, M.C., C.C. Webb, J.C. Díaz-Pérez, L.E. Davey, A.S. Payton, I.D. Flitcroft, S.C. Phatak, and M.P. Doyle. Absence of internalization of Escherichia coli O157:H7 into germinating tissue of field-grown leafy greens. Journal of Food Protection. 2014. 77 (2):189–196

Erickson, M.C., C.C. Webb, L.E. Davey, A.S. Payton, I.D. Flitcroft, and M.P. Doyle. Biotic and abiotic variables affecting internalization and fate of Escherichia coli O157:H7 isolates in leafy green roots. Journal of Food Protection. 2014. 77 (6): 872–879

Erickson, M.C., J. Liao, X. Jiang, and M.P. Doyle. Inactivation of pathogens during aerobic composting of fresh and aged dairy manure and different carbon amendments. Journal of Food Protection. 2014. 77 (11): 1911–1918

Erickson, M.C., J. Liao, X. Jiang, and M.P. Doyle. Contribution of chemical and physical factors to zoonotic pathogen Inactivation during chicken manure composting. Agriculture, Food and Analytical Bacteriology. 2014. 4: 96-108

Fan, L. and L. Truelstrup Hansen. Role of lactic acid bacteria in the fermentation and biopreservation of plant based food. In: Handbook of Vegetable Preservation and Processing (second edition). (editors: Hui, Y.H. and Ozgul Evranuz, E.). CRC Press. Book chapter (in press). 2014

Forney, C.F., G.S. Bezanson, T.C. Ells, L. Fan and D.I. LeBlanc. Impact of heat sanitation of fresh whole cantaloupe on fruit quality and volatile metabolism. Acta Horticulturae (in press). 2014

Fuentes, A., J.L. Vázquez-Gutiérrez, M.B. Pérez-Gago, E. Vonasek, N. Nitin, and D.M. Barrett. Application of nondestructive impedance spectroscopy to determination of the effect of temperature on potato microstructure and texture. Journal of Food Engineering 133:16-22. 2014

Gartner, H.; Li, Y.; Almenar, E. Improved wettability and adhesion of polylactic acid/chitosan coating for bio-based multilayer film development Applied Surface Science, 332 2015 488-493

Gil, M.I., V.M. Gómez-López, Y.-C. Hung & A. Allende. Potential of electrolyzed water as an alternative disinfectant agent in the fresh-cut industry. Food Bioprocess Technology. 2015. DOI 10.1007/s11947-014-1444-1

Gil, M.I., M. V. Selma, T. Suslow, L. Jacxsens, M. Uyttendaele, A. Allende. Pre- and post-harvest preventive measures and intervention strategies to control microbial food safety hazards of fresh leafy vegetables Critical Rev Food Science and Nutrition. 2015 (in press)

Guan, W., Zhao, X., Huber, D.J., Sims, C.A. Instrumental and sensory analyses of quality attributes of grafted specialty melons. J. Sci. Food Agric. (accepted)

Leaman, S. Giclas, H., and T. Suslow. EHEC/STEC, Produce Safety and Testing Systems. Western Growers Association and Center for Produce Safety Issue Brief. Accessible at https://cps.ucdavis.edu/ and http://ucfoodsafety.ucdavis.edu/ 2014

Lee, J., Hurr, B.M., Huber, D.J., Vallejos, C.E., Sargent, S.A. Characterization of proteases and nucleases associated with ethylene-induced programmed cell death in immature cucumber fruit. Postharvest Biol. Technol. (accepted)

Kim, M.J. and Y.-C. Hung. Effect of alkaline electrolyzed water as an inhibitor of enzymatic browning in red delicious apples. Journal of Food Biochemistry. 2014. 38:542-550

Kirtil, E., M.H. Oztop, A. Sirijariyawat, P. Ngamchuachit, D.M. Barrett, and M.J. McCarthy. Effect of pectin methyl esterase (PME) and CaCl2 infusion on the cell integrity of fresh-cut and frozen-thawed mangoes: An NMR Relaxometry Study. Food Research International. 66:409-416. 2014

Kornacki, J.L. Processing plant investigations: Practical approaches to determining sources of persistent bacterial strains in the industrial food processing environment. In: The Microbiological Safety of Low Water Activity Foods and Spices. J.B. Gurtler, M.P. Doyle, J.L. Kornacki (editors). IAFP & Springer, Food Microbiology and Food Safety. 2014. "DOI 10.1007/978-1-4939-2062-4\_5."

Kotwal, G. and J. L. Cannon. Environmental persistence and transfer of enteric viruses. Current Opinion in Virology. 2014. 4:37-43

Koutsimanis, G.; Harte, J.; Almenar, E. Development and evaluation of a new packaging system for fresh produce: A case study on fresh cherries under global supply chain conditions. Food and Bioprocess Technology: An International Journal, 8(3) 2015 655-669

Koutsimanis, G.; Harte, J.; Almenar, E. Freshness maintenance of cherries ready for consumption using convenient, microperforated bio-based packaging. Journal of the Science of Food and Agriculture, 95(5) 2015 972-982

Li, B. G. Vellidis, H. Liu, M. Jay-Russell, S. Zhao, Z. Hu, A. Wright, C.A. Elkins. Diversity and antimicrobial resistance of Salmonella enterica isolates from surface water in Southeastern United States Applied and Environmental Microbiology 2014 80 (20): 6355–6365

Lieberman, V.M., Zhao, I.Y., Schaffner, D.W., Danyluk, M.D., and Harris, L.J. Survival or growth of inoculated Escherichia coli O157:H7 and Salmonella on yellow onions (Allium cepa) under conditions simulating food service and consumer handling and storage. J. Food Prot. 2015. 78: 42-50

McKellar, R.C., Peréz Rodriguez, F., Harris, L.J., Moyne, A.-L., Blais, B., Topp, E., Bezanson, G.S., Bach, S.J., and Delaquis, P.J. Evaluation of different approaches for modeling Escherichia coli O157:H7 survival on field lettuce. Internationa​l Journal of Food Microbiology. 2014. 184, pp. 74-85.

Mendonca, A., A. Daraba, Non-thermal processing – Irradiation, In: Encyclopedia of Food Microbiology, 2nd edition, Academic Press Ltd., London, ISBN: 978-0-12-227070-3

Mendonca, A., V. Juneja, A. Daraba. Total viable counts - Metabolic activity tests, In: Encyclopedia of Food Microbiology, 2nd edition, Academic Press Ltd., London, ISBN: 978-0-12-227070-3

Ngamchuachit, P., H.K. Sivertsen, E.J. Mitcham, and D.M. Barrett. Influence of cultivar and ripeness stage at the time of fresh-cut processing on instrumental and sensory qualities of fresh-cut mangos. Postharvest Biology and Technology. 2015 (in press)

Ngamchuachit, P., H.K. Sivertsen, E.J. Mitcham, and D.M. Barrett. Effectiveness of calcium chloride and calcium lactate on maintenance of textural and sensory qualities of fresh-cut mangos. Journal of Food Science. 79(5):C786-C794. 2014

Fuentes, A., J.L. Vázquez-Gutiérrez, M.B. Pérez-Gago, E. Vonasek, N. Nitin, and D.M. Barrett. Application of nondestructive impedance spectroscopy to determination of the effect of temperature on potato microstructure and texture. Journal of Food Engineering. 133:16-22. 2014

Nguyen, T.P., Friedrich, L,M., and Danyluk, M.D. Fate of Escherichia coli O157:H7 and Salmonella on whole strawberries and blueberries of two maturities under different storage conditions. J. Food Prot. 2014. 77: 1093-1101

Ong, M.K., A. Ali, P.G. Alderson, and C.F. Forney. Effect of different concentrations of ozone on physiological changes associated to gas exchange, fruit ripening, fruit surface quality and defense-related enzymes levels in papaya fruit during ambient storage. Scientia Hort. 2014. 179:163-169.

Pliakoni, E.D., A.I. Deltsidis, and J.K. Brecht. Physical and biochemical changes in broccoli that may assist in decision-making related to international marine transport in air or CA/MA. Acta Hort. 2015. 1071: 651-657.

Plotto, A., Baldwin, E., Bai, J., Narciso, J. Whitaker, V., Chandler, C. Update on sensory evaluation of Universiyt of Florida strawberry selections Proc. Fla. State Hort. Soc. 2014 (in press)

Riad, G.S. and J.K. Brecht. Validation of a two-level MAP system in commercial strawberry distribution and simulated retail handling. Acta Hort. 2015. 1071: 613-618.

Shaw, A., C. Strohbehn, and S. Beattie. Revised. Garden Produce in Floods. Iowa State University Extension Publication. SP0328. 2014

Shaw, A., Svoboda, A., Jie, B., Nonnecke, G., Mendonca, A. Survival of Escherichia coli on strawberries grown under greenhouse conditions. Food Microbiology. 2014. doi:10.1016/j.fm.2014.06.027

Shen, Q., Soni, K.A., Nannapaneni, R. Influence of temperature on acid-stress adaptation in Listeria monocytogenes. Foodborne Pathogens and Disease. 2014. 11:43-49

Shen, Q., Soni, K.A., Nannapaneni, R. Stability of sublethal acid stress adaptation and induced cross protection against lauric arginate in Listeria monocytogenes. International Journal of Food Microbiology. 2015. 203:49-54

Shiu, J.W., D.C. Slaughter, L.E. Boyden and D.M. Barrett. Effect of the shear-to-compressive force ratio in puncture tests quantifying watermelon mechanical properties. Journal of Food Engineering 150:125-131. 2015

Song, J., L. Fan, L. Li, T. Hughes, L. Campbell Palmer, and X.H. Li. Quantitative proteomic investigation on effect of 1-methylcyclopropene treatments on postharvest quality of selected cut flowers. Acta Horticulturae. 2014 (in press)

Song, J., C.F. Forney, M.A. Jordan. A method to detection of diphenylamine contamination of stored apple fruit and storages using headspace solid phase micro-extraction and gas chromatography/mass spectroscopy. Food Chem. 2014. 160:255-259.

Sreedharan, A., Tokarskyy, O., Sargent, S.,and Schneider, K.R. Survival of Salmonella spp. on surface-inoculated forced-air cooled and hydrocooled intact strawberries, and in strawberry puree. Food Control 2015. (in press)

Suslow, T. Grower Guideline to Irrigation Water Sampling, Interpretation, and Corrective Actions. Accepted 8000-series. UC ANR Press 2014

Tao, F., L. Zhang, M.J. McCarthy, D.M. Beckles, M. Saltveit. Magnetic resonance imaging provides spatial resolution of chilling injury in Micro-Tom tomato (Solanum lycopersicum L.) fruit. Postharvest Biology and Technology 97:62–67. 2014

Tokarskyy, O., Schneider, K.R., Berry, A., Sargent, S.A., and Sreedharan, A. Sanitizer applicability in a laboratory model strawberry hydrocooling system. Postharvest Biol. Technol. 2015 (in press)

Tsouvaltzis, P. and J. K. Brecht Changes in quality and antioxidant enzyme activities of bunched and topped radish (Raphanus sativus L.) plants during storage at 5 or 10 degree C. J. Food Quality. 2014. 37: 157-167

Tsouvaltzis, P., J.K. Brecht, and D.J. Huber. Reduced pO2 better maintains visual quality, fresh weight, and antioxidant content of bunched radish (Raphanus sativus L.) than air storage. Acta Hort. 2015. 1071: 187-193.

Wakai, M.; Almenar, E. Effect of the presence of montmorillonite on the solubility of whey protein isolate films in food model systems with different compositions and pH Food Hydrocolloids. 43:612-621. 2015

Wang, L., E.A. Baldwin, W. Zhao, A. Plotto, X. Sun, Z. Wang, J. Brecht, J. Bai, and Z. Yu. Suppression of volatile production in tomato fruit exposed to chilling temperature and alleviation of chilling injury by a pre-chilling heat treatment. LWT-Food Science and Technology. 2015. 62:115-121.

Wang, Z., Narciso, J., Biotteau, A., Plotto, A., Baldwin, E. and Bai, J. Improving storability of fresh strawberries with controlled release chlorine dioxide in perforated clamshell packaging. Food Bioprocess Technol. 7:3516-3524. 2014.

Wang, Q., X Nie and M. Cantwell. Quality changes and respiration rates of fresh-cut sunchoke tubers (Helianthus tuberosus L.) J. Food Processing Preservation. DOI: 10.1111/jfpp.12271 2014

Wang, Q., X Nie and M. Cantwell. Hot water and ethanol treatments can effectively inhibit the discoloration of fresh-cut sunchoke (Helianthus tuberosus L.) tubers. Postharvest Biol. Tech. 94:40-57. 2014

Waters, B.W. and Y.-C. Hung The effect of organic loads on stability of various chlorine-based sanitizers. International Journal of Food Science and Technology. 2014. 49:867-875

Webb, C.C., M.C. Erickson, L.E. Davey, A.S. Payton, and M.P. Doyle. Construction and characterization of outbreak Escherichia coli O157:H7 surrogate strains for Use in field studies. Foodborne Pathogens and Disease. 2014 11(11):

Webb, C.C., M.C. Erickson, L.E. Davey and M.P. Doyle. Evaluation of single or double hurdle sanitizer applications in simulated field or packing shed operations for cantaloupes contaminated with Listeria monocytogenes. Agriculture. 2015. 5 (2): 231-244

Webb, C.C., M.C. Erickson, L.E. Davey and M.P. Doyle. Effectiveness of levulinic acid and sodium dodecyl sulfate employed as a sanitizer during harvest or packing of cantaloupes contaminated with Salmonella Poona. Accepted manuscript to International Journal of Food Microbiology "S0168-1605

(15) 00244-5; 10.1016/j.ijfoodmicro 2015.04.041"

Webb, C., M. Erickson, and M. Doyle. Fate of Listeria monocytogenes on freshly harvested Georgia-grown cantaloupes treated with sanitizers. IAFP Poster P1-106 2014 Indianapolis, IN

Yemmireddy, V.K. and Y.-C. Hung. Selection of photocatalytic bactericidal titanium dioxide (TiO2) nanoparticles for food safety applications. LWT - Food Science and Technology. 2015. 61:1-6

Yemmireddy, V.K. and Y.-C. Hung. Effect of food processing organic matter on photocatalytic bactericidal activity of titanium dioxide (TiO2). International Journal of Food Microbiology. 2014. 204: 75–80.

Yeoh, W.K., Ali, A., and C.F. Forney. Effects of ozone on major antioxidants and microbial populations of fresh-cut papaya. Postharvest Biol. Technol. 2014. 89:56-58.

**Activities:**

**Conference.** Cantwell (CA) Annual Fresh-cut workshop at UC Davis in 2014 provided excellent outreach to the industry. Cantwell (CA) Organizing International Fresh-cut Produce Research Conference in 2015

**Training program:** Shaw (IA) On-line food safety education for school gardens and university farms (<http://www.safeproduce.cals.iastate.edu/elementary/>).

**Milestones:** Collaborations were established between participating institutions (CA, FL, ARS-FL; MI, MS) for research on new pre-cutting and post-cutting treatments including packaging to better maintain fresh-cut product quality. The United Fresh Food Safety & Technology Council was consulted to identify industry research priorities for development of the next (2016-21) project.

**Impacts:** Availability of best-practice guidance and standardized methods for food safety risk assessments of fresh-cut product treatments that reduce the likelihood of food safety events by replacing ineffective food safety practices with science-based procedures. Participants using standard protocols for quantifying flavor-based shelf life and microbiological risk assessment.