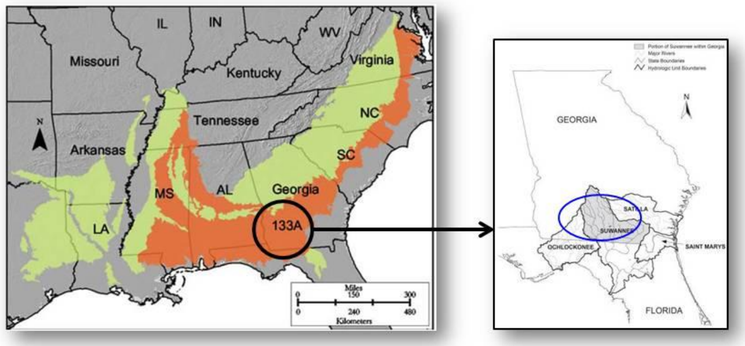
SALMONELLA DETECTION IN FARM PONDS AND IRRIGATION DISTRIBUTION SYSTEMS USED FOR MIXED PRODUCE PRODUCTION IN SOUTHERN GEORGIA

Michele T. Jay-Russell[1] and George Vellidis[2]
[1]Western Center for Food Safety, University of California-Davis
[2]Department of Crop and Soil Sciences, University of Georgia-Tifton

Introduction

- The proposed produce safety rule under the Food Safety Modernization Act (FSMA) requires that agricultural water must be safe and of adequate sanitary quality for its intended use.
- These requirements may be challenging for farmers using surface water sources such as constructed farm ponds found commonly on mixed produce farms in the southeastern coastal plane (SECP).
- Southern Georgia is representative of the SECP agricultural practices, climate, and water resources in this important produce production region.

Southeastern Coastal Plain
USDA NRCS Land Resource Region



Methods

- *Salmonella* and generic *E. coli* concentrations (CFU/100 mL) were monitored at one farm with different irrigation distribution systems during 3 vegetable growing seasons in 2012-2013.
- Water was collected from ponds in 1 L bottles at the surface and subsurface (1 m) near the intake and at the well pump; catch cups were used to collect water from sprinklers, pivots, and drip lines (start and end).
- Genetic relatedness of isolates were compared by using PFGE analysis.

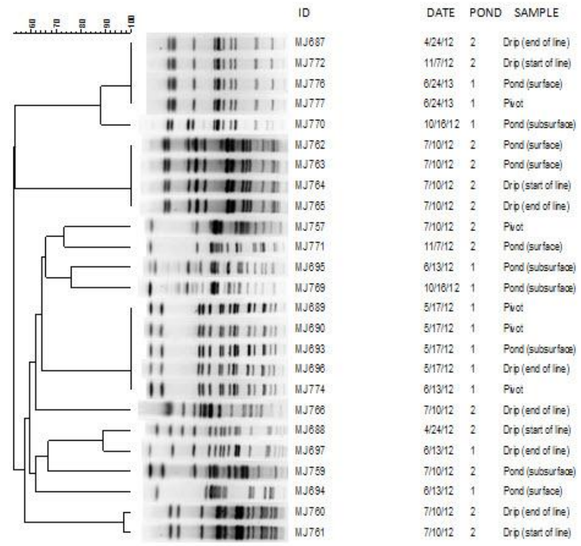
Our research objective was to conduct a pilot study to assess the presence and concentration of *Salmonella* and indicator bacteria in irrigation water sources exiting different distribution systems on a mixed produce—tomatoes, squash, peppers, eggplant, cantaloupe, leafy greens—farm in southern Georgia.

Results

Irrigation Water Source	No. Tested	*Salmonella*		Generic *E. coli* (CFU/100 mL)		
		No. Positive	% Pos	Avg	Min	Max
Pond 1						
Surface water	21	2	9.5%	7.62	0	65.26
Subsurface water (1 m)	26	7	26.9%	6.79	0	33.68
Pivot sprinkler heads	50	11	22.0%	8.1	0	58.59
Solid set sprinkler heads	16	0	0.0%	2.37	0	6.32
Pond 2						
Surface water	18	4	22.2%	7.44	0	40
Subsurface water (1 m)	18	3	16.7%	3.5	0	9.47
Drip (start of line)	36	8	22.2%	4.15	0	13.68
Drip (end of line)	36	11	30.6%	3.36	0	11.58
Well 1						
Well pump	32	0	0	0	0	0
Drip (start of line)	32	0	0	0.1	0	3.16
Drip (end of line)	26	0	0	0	0	0

- Overall, mean *Salmonella* concentration was low (<1.0 CFU/100 mL) in positive water samples from ponds, drip and pivot systems.
- Generic *E. coli* concentrations were below the proposed FSMA threshold regardless of *Salmonella* status for pond and well sources.
- Indistinguishable *Salmonella* subtypes were found in pond-pivot and pond-drip samples collected on the same day and location.

Constructed farm pond used for irrigation of vegetables in southern Georgia.



Dendogram showing genetic relatedness of selected *Salmonella* isolates.

Conclusions

- Findings from this pilot study suggest a low concentration of *Salmonella* moves through irrigation systems fed by farm ponds. Wells may be an alternative where microbial risks from surface water cannot be mitigated.
- Future research will examine more locations, the potential for transfer of *Salmonella* to produce following irrigation, and possible water disinfection options.

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