Leafy Greens Food Safety Project

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THE PROBLEM

- Food safety outbreaks from vegetables
  >>>>> Food Safety Modernization Act
- Most Americans buy leafy greens from supermarkets which originate from large farms & packing operations
- Minnesota farms are small & changes required by FSMA are expensive relative to income for small farms
OBJECTIVES

- Learn what practices MN leafy greens growers use
- Test microbe levels on lettuce after different postharvest practices >>> make data-based recommendations for MN farms
SURVEY

1. Farm location, County: ____________________________
   Nearest City/Town: ____________________________

2. Soil type: ____________________________

3. Where do you sell your produce (circle all that apply):
   CSA  Farmers' Market  farm stand  schools/institutions  other ________

4. Leafy greens grown: lettuce, spinach
   a. Varieties or names of lettuce you grow:
   b. Varieties or names of spinach you grow:

5. Which months of the year do you grow leafy greens?

6. What do you use for fertilizer?

7.1 How many days after you plant lettuce seeds until you harvest?

7.2 How many days after you plant spinach seeds until you harvest?

8. Do you wash your leafy greens?  
   Yes  No  [If NO, skip to Q 20.]

9. Where does your washing water for vegetables come from? (circle all that apply):
   a. well  
   b. municipal or city source  
   c. pond or stream  
   d. Other (specify): ______

10. If washed, how do you wash them?  
    (describe in a few sentences)

11. How do you determine/decide when to change the wash water?

12. Is sanitizer used in wash water?  
    Yes  No  [If NO skip to Q 15]

13. What is the name and brand of sanitizer used?

14. What test or method do you use to know when to add sanitizer?

15. Do you check the temperature of the wash water?  
    Yes  No

16. If yes, how?

17. What is the typical wash water temperature?

18. Are the leafy greens dried before packaging?  
    Yes  No

19. How are the greens dried? (please describe)

Turn over for a few more questions
WHERE DOES YOUR WASH WATER COME FROM?

46.9% muni, rural, city
40% well
3.1% rain water
HOW DO YOU WASH YOUR GREENS?

63.6% dunk/soak
15.6% spray
3% dunk and spray
DO YOU USE SANITIZER?

75% No
18.8% Yes
(Sanidate and tsunami)
HOW ARE THE GREENS DRIED?

(68.8% dried their greens)

43.7% Spin Dry
37.5 Air or Drip Dry
HOW ARE THE GREENS PACKAGED?

12.5% bags with holes
31.2% bags no holes
18.8% waxed boxes
6.3% unwaxed boxes
9.4% bucket

62.5% stored in cooler
MICROBE STUDY - METHODS

- Identified 8 collaborating farms
- Farmers grew lettuce from seed we provided
- We collected samples in field, after washing, from cooler, at market; measured temperatures
- One farm suggested that they wash with and without sanitizer as more direct test
- We measured presence/absence of Salmonella & Listeria, levels of E. coli & coliform bacteria
Salmonella

Listeria monocytogenes

Photo source: ecolabs.com & emdmillipore.com
E. coli – blue

Coliforms – gas bubbles

photo source:solutions.3m.com
RESULTS

- No Salmonella!
- Two putative* Listeria samples from one farm.
- No E. coli!
- Fairly low coliform bacteria levels.
- Results varied by farm more than by treatment or temperature.

* Putative – purported; commonly put forth or accepted as true on inconclusive grounds.
The bigger the number (Log CFU/g), the greater the coliforms levels.
CONCLUSIONS
Postharvest practices can decrease or increase bacteria levels.
Use sanitizer as insurance.