Fate of different *L. monocytogenes* strains on different whole apple varieties during long-term simulated commercial storage

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Why We're Here…

Popular Michigan apples recalled for Listeria risk: What to know

Honeycrisp, McIntosh apples among those recalled

Some apple orchards and cider mills in Michigan have already opened for the season (Sean Gallup/Getty Images)

A slew of popular Michigan apples are being recalled due the possible risk of Listeria contamination.

Some Recent Listeria Apple Recalls

POSTED BY **PATTI WALLER** ON JANUARY 2, 2015

We are seeing an expanding recall of apples that were used to produce caramel apples over the last several days. But, what is the recent history of recalls related to apples?

In 2014 Del Monte Fresh Produce N.A., Inc. ("Del Monte Fresh") announced an amendment of its press release dated December 10, 2014 to reflect the accurate finished product descriptor and BIUB date of two (2) items included in its voluntary recall of fresh cut fruit containing Gala red apples grown in Pennsylvania because of Listeria contamination.

In 2013 Crunch Pak® of Cashmere, Washington recalled 5,471 cases of Crunch Pak® Apple Slices due to a possible health risk from Listeria monocytogenes.

In 2012 Freshway Foods recalled 6,671 pounds of sliced apples that were packaged on November 12 using the same packaging machine, which may have been contaminated with Listeria monocytogenes.

In 2012 Missa Bay, LLC, a wholly owned subsidiary of Ready Pac Foods, Inc., of Swedesboro, New Jersey recalled a total of 293,488 cases and 296,224 individually distributed units of fruit, vegetable, and sandwich products containing apples, as listed below, with the Use-by dates of July 8, 2012 through August 20, 2012 because they contain diced or sliced apples which may be contaminated with Listeria monocytogenes.

In 2012 Reichel Foods, Inc. of Rochester, Minnesota recalled a limited amount of Dippin' Stix Sliced Apples & Caramel with Peanuts and Armour Active Packs Cheese Pizza Lunch Kits because they have the potential to be contaminated with Listeria monocytogenes.

https://www.foodpoisonjournal.com (Marler Clark)

LISTERIA OUTBREAK LINKED TO CALIFORNIA-GROWN GALA AND GRANNY SMITH APPLES

A A BY JENNY PETERS THURSDAY, JANUARY 22, 2015 | 1 DAY AGO

592 10

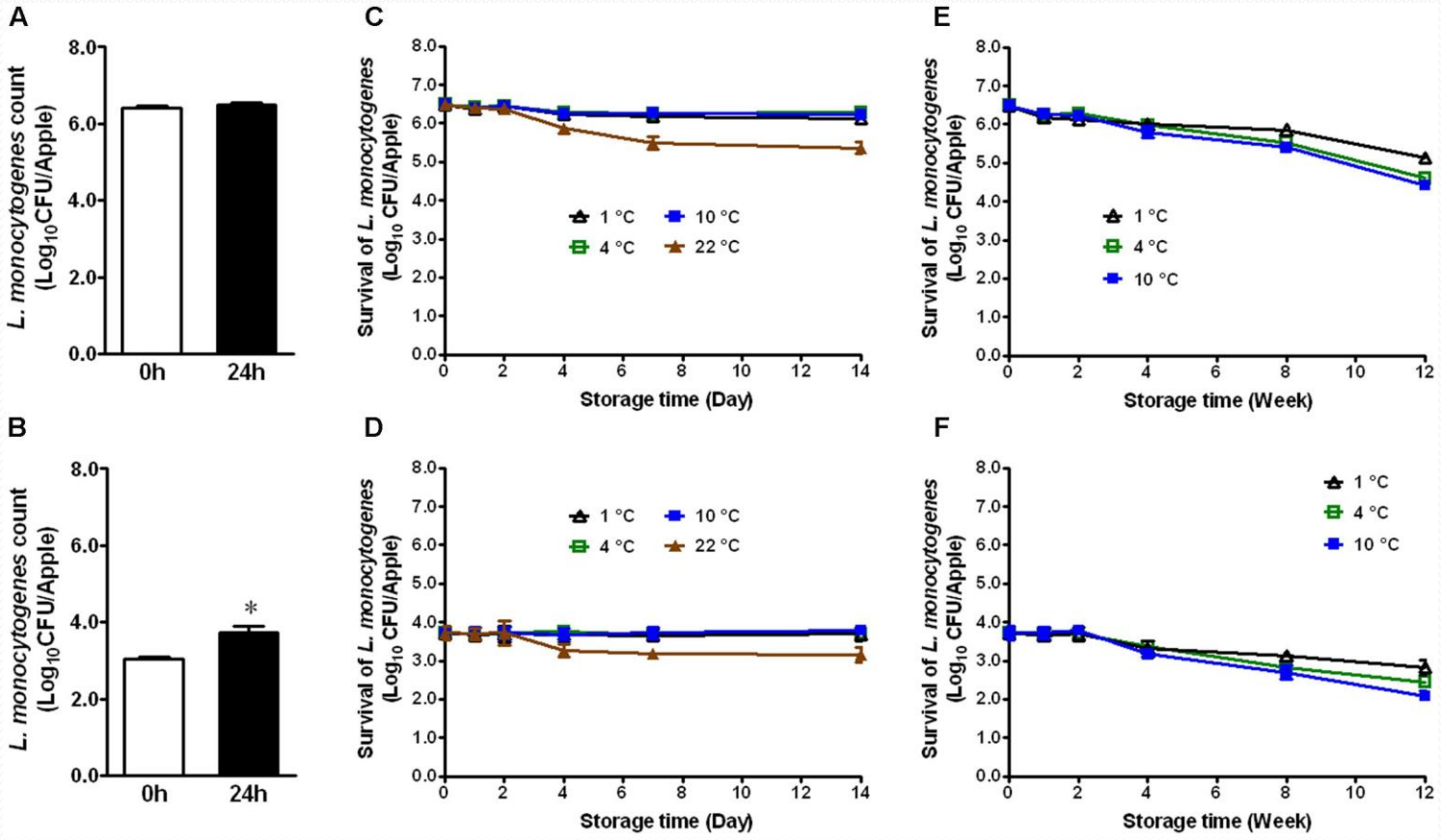
Potential sources for *Listeria* storage in storage facilities

- **Incoming**
  - **Apples**
  - **Crates**
  - **Forklift trucks**
  - **Outdoor traffic areas**
  - **Cleaning equipment**

- **Persistent**
  - **Drains**
  - **Condensate**
  - **Cold room floors**
  - **Equipment residues - biofilms**

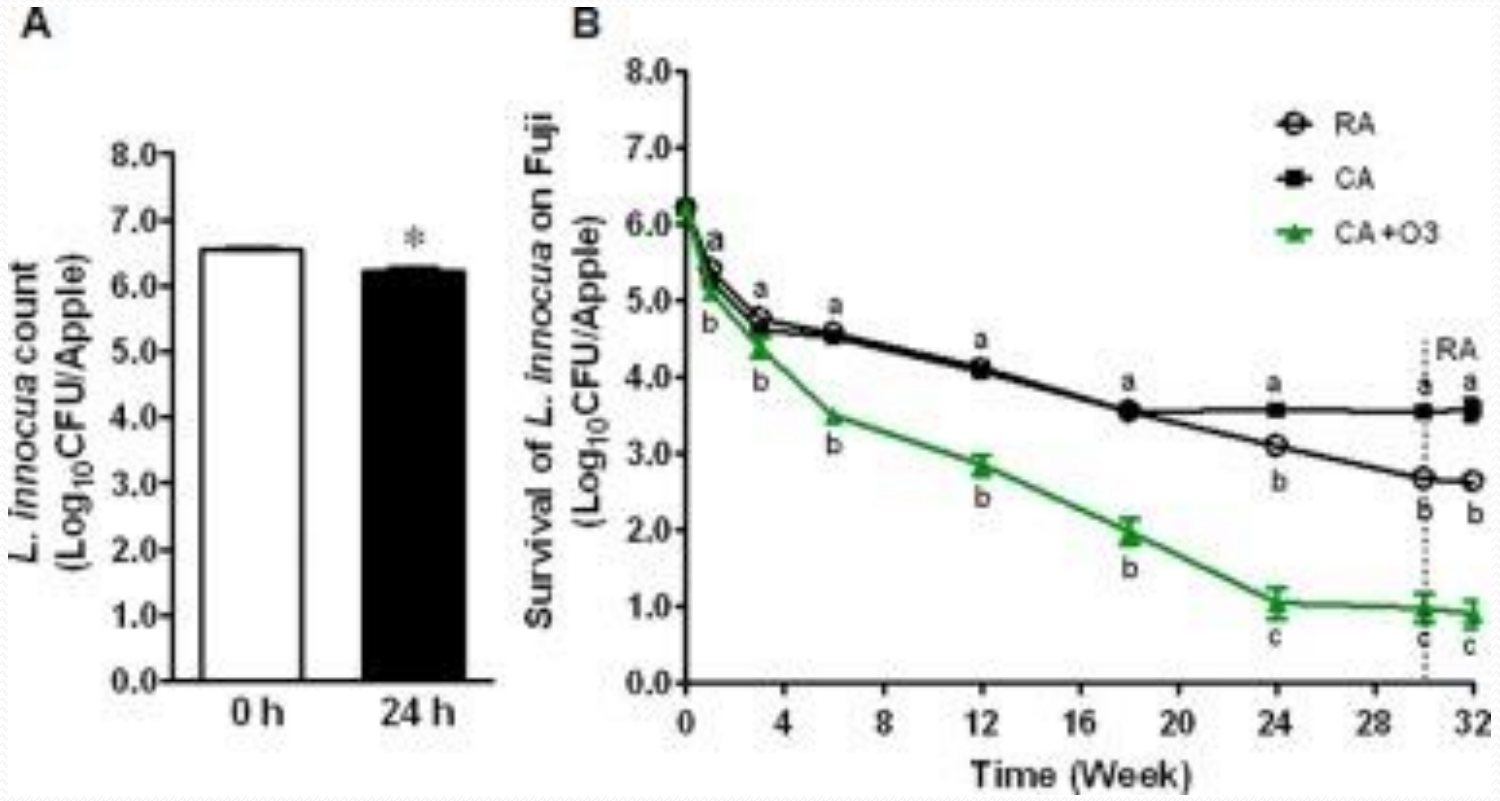
Walter et al. 2016. *J Food Prot*. 79:179

Survival of *L. monocytogenes* on fresh unwaxed Granny Smith apples during short- and long-term aerobic storage



Sheng et al. 2017 *Front. Microbiol*. 8:1396

Fate of *L. innocua* on Fuji apples during refrigerated aerobic (RA), controlled atmosphere (CA: 2% O_2, 1% CO_2) and CA + 87 ± 38.8 ppb O_3 at 33°F



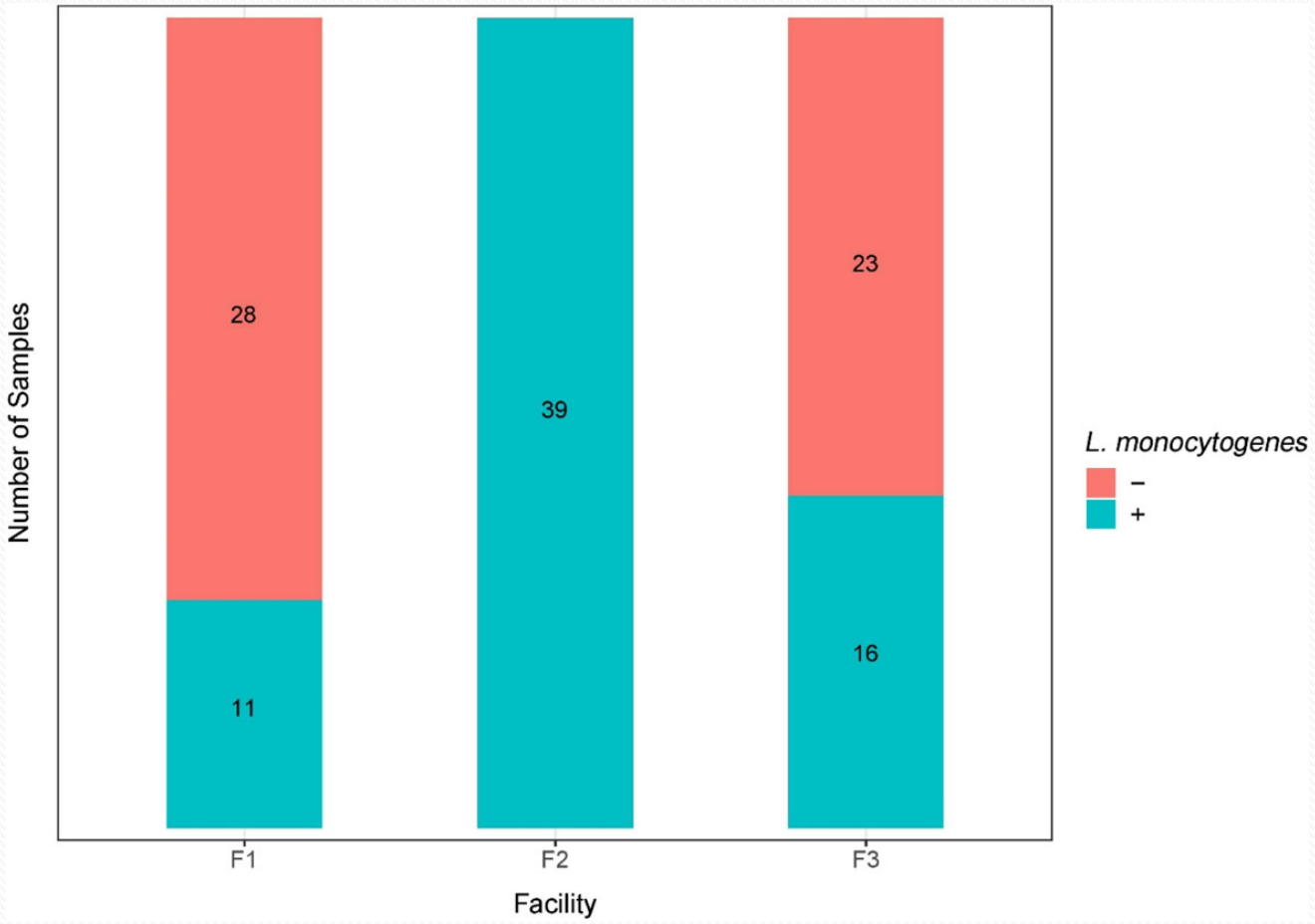
Sheng et al. 2018. *Food Microbiol.* 76:21-28

Survey of Three Apple Packing Houses in the Northeastern U.S.

- Three facilities were visited 13 times each between November 2017 and April 2018
- Total of 117 floor samples collected (39 samples/facility)
- Floor areas: under the washing, drying and waxing areas

Tan et al. 2019. Microbiome 7:115

Presence/absence of *L. monocytogenes* in three Northeastern U.S. apple packing facilities

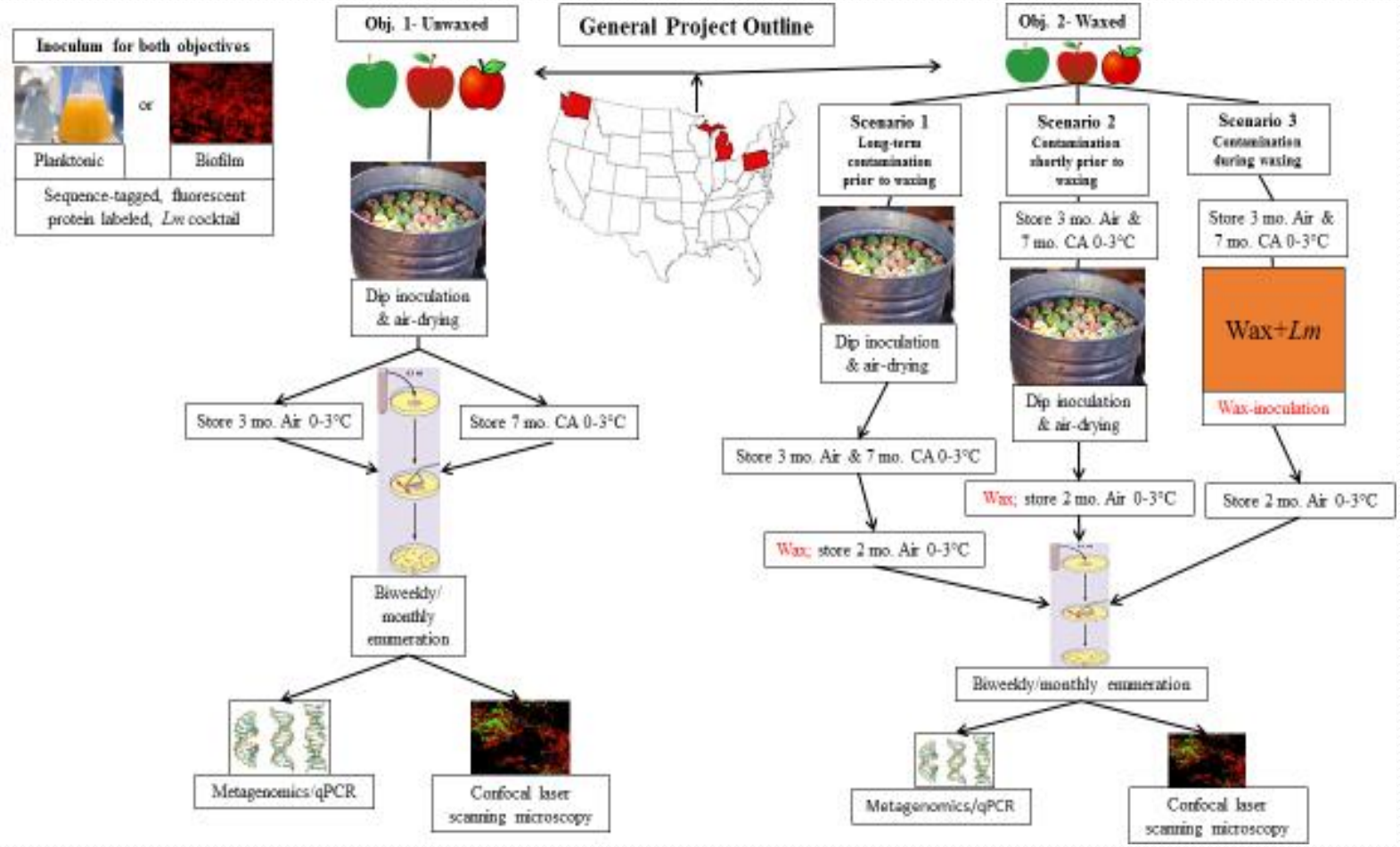


Tan et al. 2019. Microbiome 7:115

Summary

- ***Listeria monocytogenes*** **is a hardy, and dangerous foodborne pathogen**
- ***Listeria*** **contamination can be expected on fresh produce given this organism's widespread environmental persistence**
- **Proper adherence to good agricultural and processing practices will help reduce but will never totally eliminate the risk of *Listeria* in fresh produce**
- **Sanitizer levels need to be properly maintained during washing to minimize cross-contamination**

Research Plan



Overall Goals

- **Objective 1**. Assess the impact of apple variety, production region, growing season, and storage atmosphere on the survival of different *Lm* strains on unwaxed apples.
- **Objective 2.** Characterize the impact of three different industry-relevant, apple- waxing scenarios on survival of *Lm* on Granny Smith, Gala or Honeycrisp apples during atmospheric storage.

Some important questions that our CPS project will answer -

- Do different foodborne outbreak strains of *Lm* differ in their ability to survive on apples?
- Does the physiological state of *Lm (*planktonic (i.e., broth) culture vs. a biofilm impact *Lm*'s subsequent fate on apples?
- Does storing apples in air versus a controlled atmosphere (low oxygen and low carbon dioxide) affect *Lm* survival?
- Does the variety of apple (Gala, Granny Smith, Honeycrisp), growin region (WA, MI, PA) and growing season affect how *Lm* attaches and survives on apples?
- Does apple waxing affect *Lm* survival?


KEEP
CALM
AND
STAY
TUNED

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