

Industry Update: In-shell Hazelnut Decontamination

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A bit about me....



- I grew up in Winchester, Ontario
- I studied the biology of catkin dormancy in hazelnut trees
- I work out of OMAFA's Guelph office and live in Georgetown
- I am a bagpiper, currently playing with the Guelph competition band

Hazelnut cost of production update

- Updating COP in 2026
- **Production systems** approach to model cost of production
- Determining what are the typical production practices for the hazelnut enterprise
- **Production practices questionnaire has been developed**
- **To participate:**
- john.molenhuis@ontario.ca

Establishment and Production Costs for Hazelnuts in
Ontario

2018 Economic Report



Let's talk Food Safety

and no, we're not...



Producers have a responsibility to sell produce that is safe

Safe = free from levels of contamination that will cause harm

In-shell nuts: Ontario Regulation 119/11

- OMAFA collects samples of in-shell nuts each year for laboratory testing under the Food Safety Monitoring Program
<http://www.ontario.ca/producesafety>
- If you have additional questions about the Food Safety Monitoring Program or need more info, email FPO.OMAFRA@ontario.ca
- Requires that no person shall sell, pack, transport or harvest for human consumption any produce (including in-shell nuts) that is **contaminated**.
 - Also includes requirements related to packaging, labelling, advertising, and retail display signage.

Processed nuts (e.g. roasted): Ontario Regulation 493/17 - Food Premises

- Covers the premises in which nuts are processed
- Processing activities are outside of OMAFA's jurisdiction

Contamination as defined in O. Reg. 119/11

“contaminated” means, with respect to any food, that the food:

(a) contains or has been **treated with or exposed to**,

(i) **a substance not permitted** by, or in an amount in excess of the limits prescribed under the *Canadian Environmental Protection Act, 1999*, the *Food and Drugs Act* (Canada) and the ***Pest Control Products Act* (Canada)**, or

(ii) **any source of ionizing radiation** not permitted by, or in excess of the limits prescribed under the *Food and Drugs Act* (Canada), or

Contamination as defined in O. Reg. 119/11

“contaminated” means, with respect to any food, that the food:

(b) contains or has been **exposed to a hazard**;

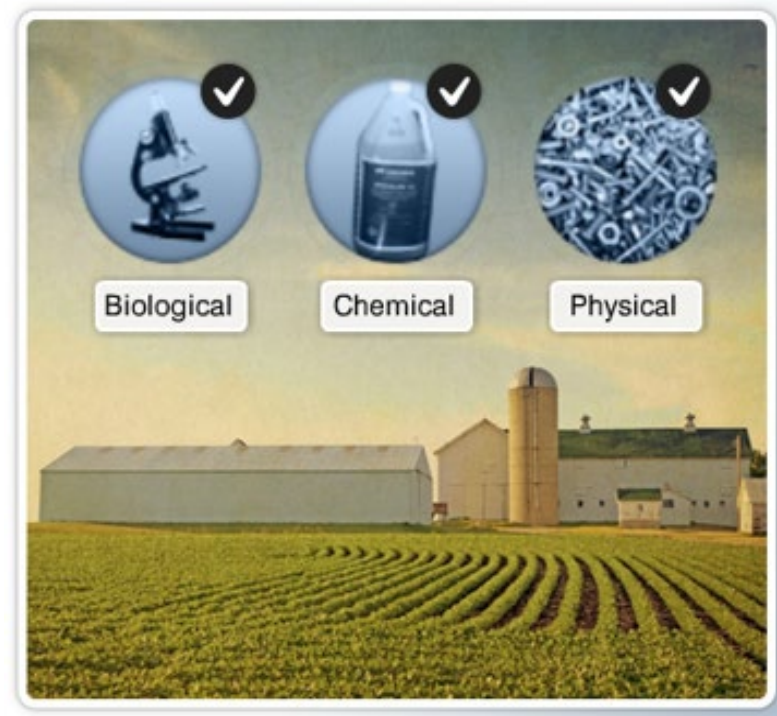
“hazard” means **a biological, chemical or physical agent** or factor, a condition of a food, an agricultural commodity or seed for sprouting or the environment in which a food, an agricultural commodity or seed for sprouting is produced, processed, handled or stored, if the agent, factor, condition or environment, as the case may be, may directly or indirectly **cause the food or agricultural commodity to be unsafe for human consumption** in the absence of its control. O. Reg. 119/11, s. 4 (5); O. Reg. 127/12, s. 3.

Food Safety Hazards

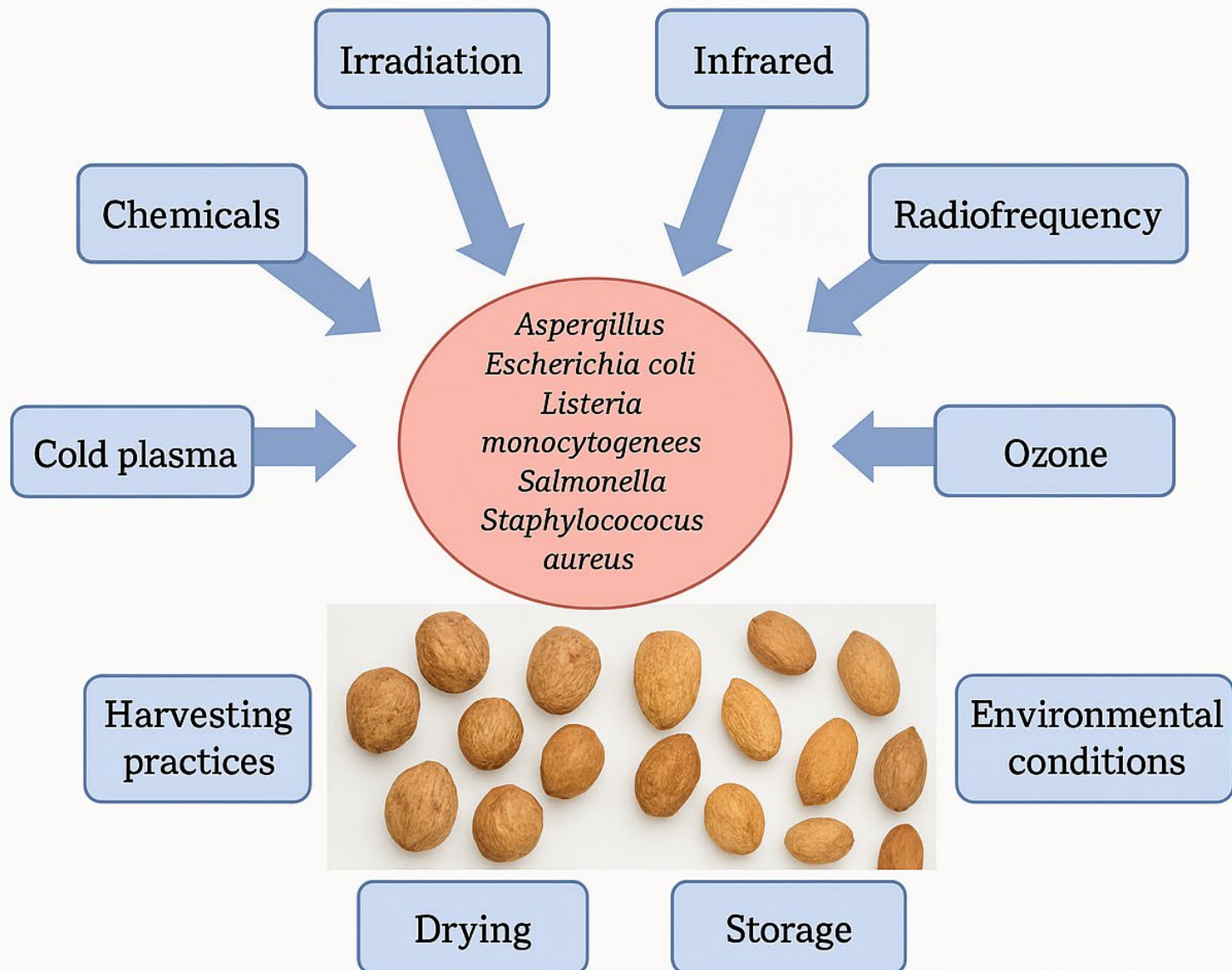
- Contaminated food often cause food borne illness
- Contamination can be caused by many types of food safety hazards

These Hazards are grouped into three categories:

- **Biological** (bacteria, viruses, parasites)
- **Chemical** (toxins, allergens, aflatoxins, products)
- **Physical** (glass, wood, shells, rocks)



Methods to control microbial contamination of nuts



Bleach cannot effectively decontaminate in-shell nuts

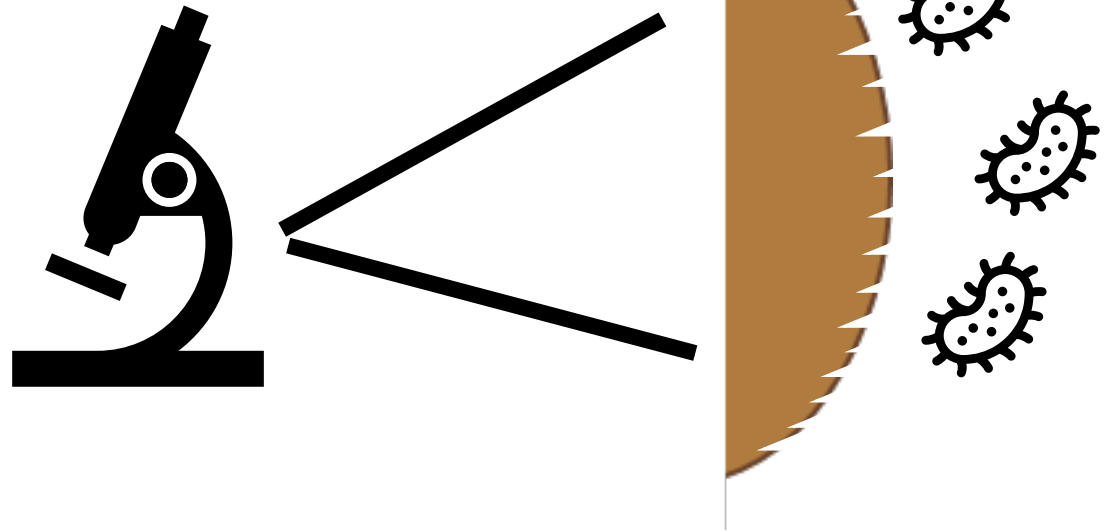
Effects of Water, Sodium Hypochlorite, Peroxyacetic Acid, and Acidified Sodium Chlorite on In-Shell Hazelnuts Inoculated with *Salmonella Enterica* Serovar Panama

Lisa D. Weller, Mark A. Daeschel, Catherine A. Durham, and Michael T. Morrissey

45 hazelnuts were inoculated with 8.07 log CFU/hazelnut and treated for 15 minutes with each chemical.

Chemical	Log reduction (Log CFU/Hazelnut)
Water	0.1
NaOCL, 25 ppm, pH~ 6.5	0.66
NaOCL, 50 ppm, pH~ 6.5	0.43
PAA-80 ppm	1.34
PAA-120 ppm	1.46
ASC-450ppm, pH~ 2.85	1.64
ASC- 830 ppm, pH~ 2.85	2.3
ASC- 1013 ppm	2.65

Nooks and crannies make decontamination difficult



There are no commercially validated, accessible methods to decontaminate in-shell hazelnuts

Thermal

- Steam blanching (88°C, 10 min) achieved a 5-log reduction of *Salmonella* cocktail on in-shell hazelnuts with no quality change (Letchworth et al., 2020).

Non-thermal

- Pulsed UV light: Treatment at 3800 V delivering 5.6 J/cm² per pulse at an 8-cm distance for 45 seconds achieved a 3.84-log reduction of *S. Enteritidis* on walnuts with no quality loss.
- Ozone (microbial reduction): In-shell almonds treated under vacuum with ozone–oxygen mixture achieved a 2.9-log reduction of *S. Enteritidis* (Perry et al., 2019).
- Ozone (aflatoxin degradation): 20 ppm for 20 min (12.89 meqO₂/kg) reduced AFB1 by ~39% and total aflatoxins by ~31% on hazelnuts, but also lowered α-tocopherol by ~25% (Atakan & Caner, 2021).
- Cold plasma: Low- and atmospheric-pressure plasma treatments reduced *A. flavus* and *A. parasiticus* spores on hazelnuts by 4.7–5.6 log cfu/g with no quality loss (Mutlu, 2019).

Private companies or large processors may have solutions

But...

- Their claims are not currently reviewable by external experts
- Their solutions may be inaccessible



Food safety testing: helpful, but NOT sufficient on its own

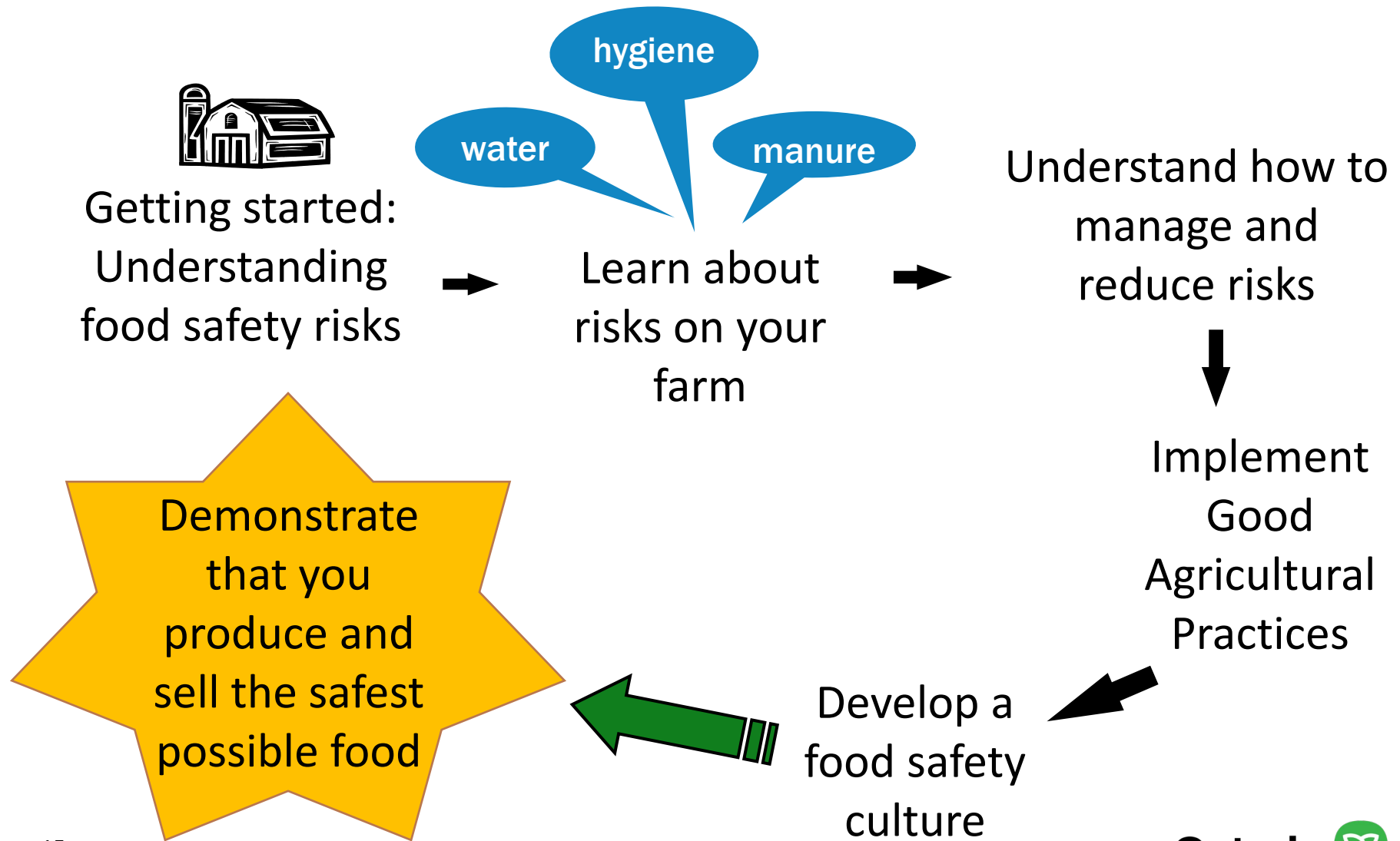
Pros

- Can help detect hazards or contamination if they exist
- Provide a snapshot of product status at the time of testing
- Occasional testing can provide some peace of mind whether your practices are OK

Cons

- Represent only a small sample of a batch
- Represent only a point in time snapshot
- Cannot guarantee that all the nuts in a batch are decontaminated uniformly
- Should not replace preventive food safety controls

A well-documented, holistic approach is the best way to ensure food safety



Some examples of GAP's/GMP's

- Don't use manure or let nuts come in contact with fecal matter
- Use clean irrigation water that is not contaminated
- Observe pre-harvest intervals for pest control products and herbicides
- Harvest nuts as soon as possible
- Clean and dry nuts within 24 hours of harvest
- Use potable water to clean nuts
- Ensure all nuts in a container are drying quickly
- Don't store chemicals or contaminants next to irrigation water, wash water, or nuts
- Store nuts in humidity and temperature-controlled environments

Food Safety Monitoring Program: no contamination has been found so far

All samples are tested for Shigatoxigenic *E. coli*, *E. coli* O157, *Salmonella* spp. and aflatoxins.

Table 5. number of in-shell nut samples tested 2020 to 2024.

In-shell nut samples collected	2024	2023	2022	2021	2020
Annual total	25	20	20	20	20

No contamination found

Bleach can be used to prevent the spread of contamination in wash water

- Use ***food-grade*** bleach (sodium hypochlorite)
- Use **50-150 ppm ... NO MORE**
 - approximately 2/3 - 2 tsp of 5.25% bleach in 1 gallon of water
- Contact time of **no more than 5 minutes**
- ***Thoroughly* rinse** with potable water
 - Nut shell surface should have no more than 7 ppm free residual chlorine after rinsing



Food Safety for Fresh Fruits and Vegetables

**CANADAGAP FOOD SAFETY MANUAL
FOR FRESH FRUITS AND VEGETABLES[®]**

Food Safety and Traceability E-Learning Courses

Developed by: OMAFA

<https://bdc.ridgetownc.com/>



Producers:

Ag & Food Producer (PDF)

Ag & Food Producers
(Interactive)

Processors:

Ag & Food Processor (PDF)

Ag & Food Processors
(Interactive)

Produce Webinar Series:



https://viriniatech.zoom.us/webinar/register/WN_ZOJEGQqjRPa47iAQd1UzYw#/registration

Questions?