

CONTAMINATED IMPORTED VIETNAMESE HERBS RETAILED IN THE CITY OF TORONTO

Ryerson University

Diana Nguyen and Corinne Ong
Ryerson University

Background

- Foodborne pathogens are a growing concern within the food industry, considering the increased rates of population growth, demand for fresh produce, globalization, and intensive food processing (Lynch, 2009).
- Pathogen-contaminated produce accounts for 5-23% of foodborne illnesses in many countries (Markland et al., 2012).
- Bacterial contamination of food by *E. coli* and coliforms is very much prevalent, with multiple outbreaks every year (CDC, 2016).

Objectives

- Establish *E. coli* and coliform contamination levels in ethnic herbs
- Compare levels of *E. coli* and coliform contamination amongst sampled herbs, the Thai basil (*Ocimum basilicum*), purple perilla (*Perilla frutescens*), and fish mint (*Houttuynia cordata*)
- Address gap of risk of food contamination within ethnic communities
- Consider the relationship of globalization and agricultural importation and the contamination of imported herbs within ethnic communities



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Methods

A bundle of each type of herb, Thai basil (*Ocimum basilicum*), purple perilla (*Perilla frutescens*), and fish mint (*Houttuynia cordata*), was bought from a variety of supermarkets located in the city of Toronto. The herbs were identified by species, date purchased, place of origin and assigned a number. The retail location was not identified to retain confidentiality of the supermarkets. Each sample bought, remained in its original packaging and was stored within a portable cooler before shipment for bacterial identification. During the sample collection period, the samples remained in environments with a minimum temperature of 4°C to prevent any additional growth of bacteria, fungi, or other microbes.

Within 24 hours of purchase, the samples were sent to the diagnostic Agriculture and Food Laboratory (AFL) of the University of Guelph for bacterial identification on herb surfaces, as the laboratory services are unavailable at Ryerson. The laboratory specialized in microbial identification in food samples and conducted enumeration tests of *E. coli* and coliforms, following the MFHPB-34 procedure (University of Guelph Agriculture and Food Laboratory, personal communication, October 12, 2016). A total of 22 samples, 12 Thai basil, 4 purple perilla and 6 fish mint samples, were submitted to the lab.

Table 1: **Levels of *E. coli* Contamination in Vietnamese Herbs**

	Satisfactory (<10 cfu/g)		Marginal (<100 cfu/g)		Potentially Hazardous (>100 cfu/g)		Total
	%	n/N	%	n/N	%	n/N	
Thai Basil	54.55%	12/22	0.00%	0/22	0.00%	0/22	12/22
Purple Perilla	9.09%	2/22	0.00%	0/22	9.09%	2/22	4/22
Fish Mint	27.27%	6/22	0.00%	0/22	0.00%	0/22	6/22
Total		20		0		2	22

Figure 1: ***E. coli* Contamination in Vietnamese Herbs**

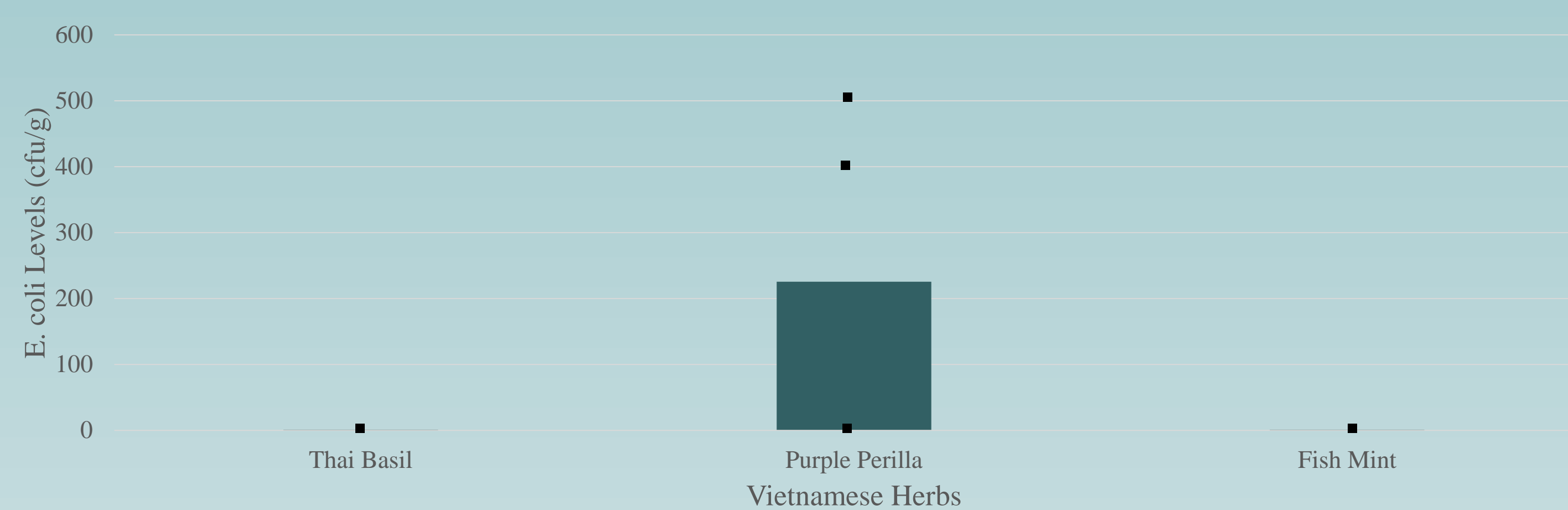


Table 2: **Levels of Coliform Contamination in Vietnamese Herbs**

	Satisfactory (<10 cfu/g)		Marginal (<100 cfu/g)		Potentially Hazardous (>100 cfu/g)		Total
	%	n/N	%	n/N	%	n/N	
Thai Basil	54.55%	12/22	0.00%	0/22	0.00%	0/22	12/22
Purple Perilla	0.00%	0/22	13.64%	3/22	4.55%	1/22	4/22
Fish Mint	0.00%	0/22	0/22	0/22	27.27%	6/22	6/22
Total		12		3		7	22

Figure 2: **Coliform Contamination in Vietnamese Herbs**

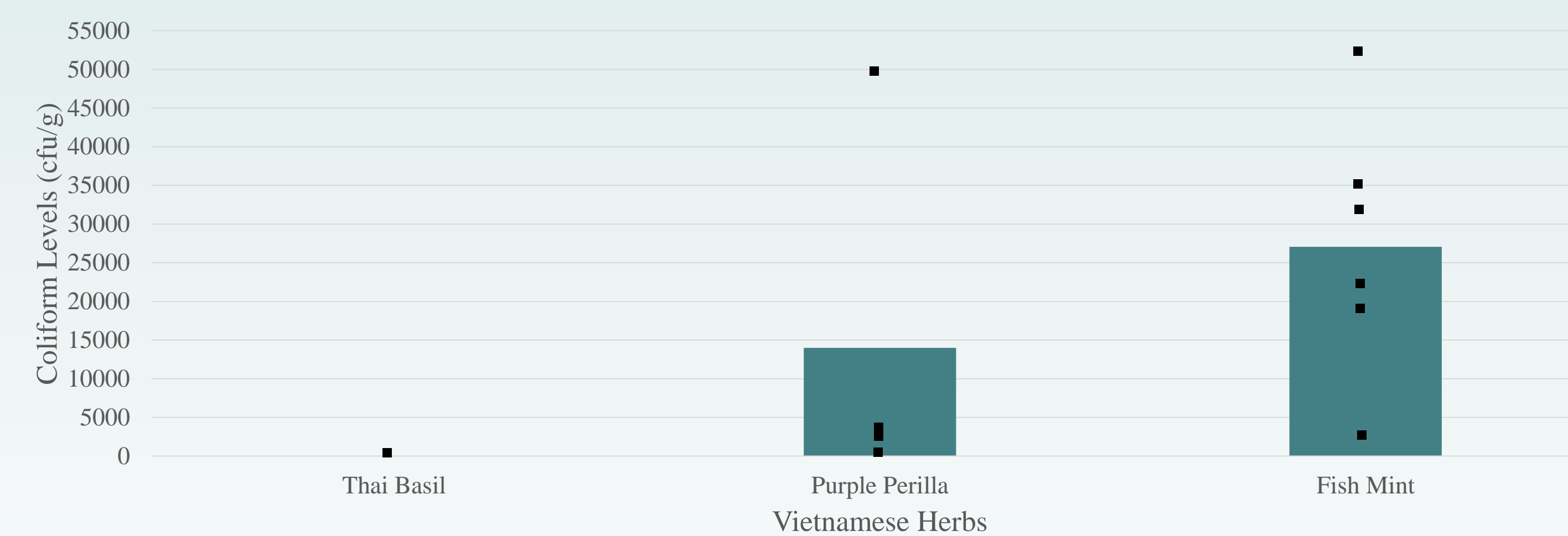


Table 3: **Coliform and *E. coli* Contamination Levels in Vietnamese Herbs**

	Contaminated (E.coli)		Not Contaminated (E. coli)		Total
	%	n/N	%	n/N	
Contaminated (Coliforms)	9.09%	2/22	27.27%	6/22	10/22
Not contaminated (Coliforms)	0.00%	0/22	63.64%	14/22	12/22
Total		2		20	22

Results

- 40.9% (9/22) of collected herbs were recorded to have significant levels of *E. coli* and/or coliform contamination, deeming it unsatisfactory to be consumed raw.
- Only one sample of all contaminated herbs (1/9) was marginally acceptable, as its level of contamination still falls within the acceptable microbial limits of Health Canada (2010).
- Contamination by *E. coli* and coliforms were highest in samples of purple perilla, with 100% (4/4) of collected samples having significant levels of at least one bacteria type, 75% (3/4) of which were unsatisfactory for human consumption if served raw (Health Canada, 2010).
- Although there were negative results in *E. coli* levels for fish mint, there were extremely levels of coliform bacteria in all collected samples, with levels above than 3.0 x10³ cfu/g.
- No contamination was seen in any Thai basil specimens.

Conclusion

It is evident that in comparison to current health standards, the *E. coli* and coliform presence is a concern amongst ethnic herbs retailed in the City of Toronto. Although, contamination rates were generally found to be low amongst herb specimens, there is a potential likelihood of acquiring a gastrointestinal illness after consuming these herbs. The results of this project encourage preventative steps and sanitary practices to improve the quality of herbs and safety of raw produce consumption.

Limitations

- Small sample size did not allow for complex analysis of data
- Lack of available data on herb origin and importation status
- High possibility of cross contamination at retail end
- Herb specimen availability across the City of Toronto was inconsistent

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