Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

Parasites in Imported Whole Fresh Sugar Snap and Snow Peas - April 1, 2016 to March 31, 2019

Food microbiology - Targeted surveys - Final report

Food microbiology targeted surveys – September 2019

Summary

Fresh produce such as berries, leafy vegetables, and herbs have been identified as sources of parasites and have been implicated in numerous foodborne illness outbreaks worldwide. Fresh produce can become contaminated with parasites during production, harvest, post-harvest handling, packaging and distribution. Previous targeted surveys have reported on the occurrence of parasites in mushrooms, berries, leafy herbs, leafy vegetables and green onions. This report focuses the occurrence of parasites in imported whole sugar snap and snow peas, both of which have been implicated in foodborne illness outbreaks. As fresh sugar snap and snow peas are often consumed raw or lightly cooked, the presence of parasites creates a potential risk for foodborne illness.

Considering the factors mentioned above and their relevance to Canadians, imported fresh sugar snap and snow peas were selected for targeted surveys. Over the course of this study (April 1, 2016 to March 31, 2019), a total of 932 samples of sugar snap and snow peas were collected from retail locations in 11 cities across Canada and tested for the following parasites of concern: *Cyclospora cayetanensis* (*C. cayentanensis*)*, Cryptosporidium* species (spp.), *Toxoplasma gondii* (*T. gondii*). Of the 932 samples, 489 were also tested for *Giardia* spp. All samples were found to be free of parasite deoxyribonucleic acid (DNA). Regardless, sugar snap and snow peas are a known potential source of foodborne illness causing parasites and as such, safe handling practices are recommended for producers, retailers and consumers.

What are targeted surveys

Targeted surveys are used by the Canadian Food Inspection Agency (CFIA) to focus its surveillance activities on areas of highest health risk. The information gained from these surveys provides support for the allocation and prioritization of the Agency's activities to areas of greater concern. Originally started as a project under the Food Safety Action Plan (FSAP), targeted surveys have been embedded in the CFIA's regular surveillance activities since 2013. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying and characterizing new and emerging hazards, informing trend analysis, prompting and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. The CFIA works with federal, provincial, territorial and municipal governments and provides regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

Why did we conduct this survey

According to the Food and Agriculture Organization of the United Nations/World Health Organization (FAO/WHO) ranking for risk management of food-borne parasites, fresh produce has been implicated in numerous foodborne illness outbreaks worldwide[1]. Fresh produce has also been categorised as the primary food vehicles of *Giardia duodenalis, C. cayetanensis* and *Cryptosporidium* spp. and secondary food vehicles of *T. gondii*[1]. Fresh produce can be exposed to contaminated water during primary production and postharvest handling, as well as to inadequately composted organic fertilizers (manure) during primary production[1]. Fresh snap and snow peas are often consumed raw or lightly cooked, therefore the presence of parasites creates a potential risk for foodborne illness.

Given previous outbreaks associated with imported sugar snap[2, 3] and snow peas[4], and the fact that they are frequently consumed by Canadians in all age groups[5], these commodities were selected for a three year targeted survey from April 1, 2016 to March 31, 2019 to investigate the occurrence of parasites (*Cryptosporidium* spp., *C. cayetanensis*, *T. gondii, Giardia* spp.) in imported sugar snap and snow peas available at retail in Canada.

What did we sample

For this survey, a sample consisted of a single unit (individual consumer-size package(s) from a single lot) with a total weight of at least 250 g. All samples were collected from national retail

chains and local/regional grocery stores located in 11 major cities across Canada. These cities encompassed 4 geographical areas:

- Atlantic (Halifax and Saint John)
- Quebec (Quebec City, Montreal)
- Ontario (Toronto, Ottawa)
- West (Vancouver, Kelowna, Calgary, Saskatoon and Winnipeg)

The number of samples collected from these cities was in proportion to the relative population of the respective areas.

A total of 932 imported whole fresh sugar snap and snow pea samples were collected throughout the year between April 1, 2016 and March 31, 2019.

The types of peas collected and analysed were: 58% (544/932) sugar snap peas; 42% (388/932) snow peas. All samples were imported from various countries and were either conventionally or organically produced.

What analytical methods were used and how were samples assessed

Samples were analyzed using CFIA internally developed methods that detect the presence of DNA of *C. cayetanensis*, *Cryptosporidium* spp., *T. gondii* [6] and *Giardia* spp.[7, 8].

At the time of writing this report, no assessment guidelines had been established in Canada for parasites in fresh produce. As the analytical methods used in this survey can only determine the presence or absence of parasite DNA, they cannot discriminate between living and dead parasites. Therefore, the detection of parasite DNA was assessed as "investigative" and required further consideration to determine appropriate follow-up actions (table 1).

Table 1 - Analytical methods and assessment criteria for the detection of parasite DNA in sugar snap and snow peas

Parasite	Method(s)	Satisfactory	Investigative
C. cayetanensis	qPCR assay, melting curve analysis, & sequencing	Not detected	Detected
Cryptosporidium spp.		Not detected	Detected
T. gondii		Not detected	Detected
Giardia spp.	Nested PCR	Not detected	Detected

What were the survey results

A total of 932 imported whole fresh sugar snap and snow pea samples were analysed for *C. cayetanensis, Cryptosporidium* spp., *T. gondii* and *Giardia* spp. Of the 932 samples, 489 samples were also tested for *Giardia* spp. No parasite DNA was detected in any of the samples tested (table 2). All samples analysed were imported and 98.5% (918/932) were conventionally produced (table 3).

Table 2 - Assessment results of sugar snap and snow peas

Parasite	Number of samples tested	Satisfactory
C. cayetanensis	932	932
Cryptosporidium spp.		
T. gondii		
Giardia spp.	489	489

Table 3 - Product origin and production practice of sugar snap and snow pea samples

Product origin	Number of samples tested	Conventional	Organic
China	350	350	0
United States	202	199	3
Mexico	182	173	9
Guatemala	100	100	0
Peru	36	36	0
Mexico and Guatemala	5	5	0
United States and Guatemala	2	2	0
Taiwan	2	2	0
Unites States and/or Guatemala	1	1	0
United States and Peru	1	1	0
Unknown	51	49	2
Total	**932**	**918**	**14**

What do the survey results mean

In this survey, all (100%) of the fresh whole sugar snap and snow peas samples analyzed were free of *C. cayetanensis, Cryptosporidium* spp., *T. gondii* (n=932) and *Giardia* spp. (n=489) DNA.

At the time of writing this report, no previous surveillance studies could be found on parasites in fresh sugar snap or snow peas. Previous targeted surveys were conducted by CFIA on whole mushrooms and a literature search found previous surveillance studies on parasites in other fresh produce sold at retail. See table 4 for a comparison of the parasite prevalence rates between the CFIA and other international studies. The parasite prevalence rates observed in the CFIA studies are comparable. The differences in the parasite prevalence rates observed between the CFIA and international studies may be attributable to differences in product type, detection methodology (DNA-based vs. microscopy), as well as agricultural practices.

Table 4 - Comparison of parasite prevalence in various studies

Study	Commodity	Detection method	*C. cayetanensis*	*Cryptosporidium* spp.	*T. gondii*	*Giardia* spp.	Total number of samples
Current study	Whole fresh sugar snap and snow peas	DNA-based	0%	0%	0%	0%	932 (489 for *Giardia spp.)*
2016-2017 Targeted survey[9]	Whole mushrooms	DNA-based	0%	0%	0%	0%	483
2011-2012 Targeted survey[10]	Whole mushrooms	DNA-based	N/A	0.5%	N/A	N/A	198
2014-2016 Indian study[11]	Cabbage carrot chili coriander cucumber radish turnip tomato	Microscopy	N/A	6%	N/A	4.6%	284
2015-2016 Italian study[12]	Ready-to-eat salads	Microscopy and DNA-based	1.3%	0.9%	0.8%	0.6%	648

N/A: not applicable

Our survey results show that all of the fresh sugar snap and snow pea samples analyzed were free of parasite DNA. Regardless, fresh produce including sugar snap and snow peas are a known potential source of foodborne illness causing parasites and as such, safe handling practices are recommended for producers, retailers and consumers.

References

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