FREQUENTLY ASKED QUESTIONS (FAQs)

PRELIMINARY RESULTS FROM THE FIRST YEAR OF THE STUDY

Q. What were the main findings from Year 1 of the study?

Levels of arsenic were typically higher in Yellowknife produce than Canadian supermarket produce. A risk assessment was completed using a blended diet of Yellowknife produce and supermarket produce and indicated that Yellowknife produce is safe to eat. In the second year of this study we will be exploring some of the reasons as to why levels of arsenic are higher in Yellowknife produce.

Q. What are the garden soil results?

In this study, we found that levels of antimony and lead were below the Canadian soil guidelines in all samples that we collected.

Arsenic levels in Yellowknife garden soils were much lower than levels measured in undisturbed or natural soils around Yellowknife, but were elevated relative to national soil quality guidelines (CCME 2021). We are undertaking more work on the soils to explore whether arsenic in garden soils is derived from natural sources or is from past mining emissions. We are also exploring differences in soil arsenic for garden soils from different sources (i.e. bagged hardware store vs locally harvested soil).

The soil arsenic concentrations measured in this study ranged from 2 to 44 mg/kg with an average of 16 mg/kg. The Canadian guideline for arsenic in residential and agricultural soils is 12 mg/kg. Our research team has previously estimated a natural regional background limit for arsenic in soil of 30 mg/kg.

Q. What are the garden produce results?

Levels of arsenic in Yellowknife produce were typically higher than those measured in a national supermarket survey (TDS). The research team is investigating the potential reasons for elevated arsenic levels in local produce. Some areas to explore include differences in arsenic levels between unpeeled vs peeled vegetables and cooked vs uncooked vegetables. The research team is also looking into specific details about uptake of metals by vegetables during their growing cycle. The higher levels of arsenic do not mean that Yellowknife produce is unsafe to eat.

Q. Have things changed since 2001?

Arsenic concentrations are still higher in Yellowknife garden produce compared to grocery store levels, which was the case in 2001. Previously, arsenic levels in the 2001 study were compared to a study from 1979. Arsenic levels were approximately five times lower in the 2001 study when compared to the 1979 results, with lettuce and berries having comparable levels between the two studies. The concentrations in garden produce collected in 2020 are similar to those in 2001.

Arsenic concentrations in soil were lower in this most recent study compared to levels measured in the 2001 study. The research team is exploring reasons why this may be the case.

Q. Are there certain types of vegetables that have higher levels of arsenic?

Previous studies have shown that higher levels of arsenic are often measured in leafy green vegetables such as lettuce, beet greens, and celery leaves compared to lower levels in potatoes, cabbage, peas, rhubarb, garlic, broccoli and zucchini. However, the small sample size in previous studies mean generalizations should be made with caution.

The vegetable arsenic concentrations measured in this study differed only slightly between the types of produce.

- Concentrations of arsenic in kale ranged from 20 ng/g to 178 ng/g with an average of 64 ng/g.
- Concentrations of arsenic in carrots ranged from 9 to 120 ng/g with an average of 41 ng/g.
- Concentrations of arsenic in potatoes ranged from 13 to 95 ng/g with an average of 46 ng/g.

Q. Is my garden produce safe to eat?

A preliminary risk assessment for the consumption of garden produce using data from the Yellowknife Garden Metals Study indicated that that there is VERY LOW RISK of cancer associated with eating garden produce grown in Yellowknife. This is consistent with work recently completed by the Giant Mine Remediation Team (see link below). The risk assessment work completed in 2001 also identified a very low risk but looked at non-cancer risk.

https://www.enr.gov.nt.ca/sites/enr/files/resources/arsenic_human_health_risk_assessment_summary_june_2021_0.pdf.

Based on these results there is no evidence that people should avoid eating their garden produce. We looked at selected nutrient levels (calcium, iron, potassium and zinc) and found that for the most part they are higher than in grocery store produce – Yellowknife garden vegetables are nutritious.

Q. What is risk assessment exactly, and how was it done?

Human health risk assessment is a valuable tool used to assess the POTENTIAL impact of a hazard on a person or community in various scenarios. In this case, for arsenic, the scenario includes a maximum reasonable exposure, which is over a lifetime (80 years). Risk assessment cannot measure potential or actual health effects. We estimated the cancer risk from a blended diet of specific vegetables from both the supermarket and a local backyard. This cancer risk is the additional risk over background lifetime cancer risk.

The risk assessment results depend on specific assumptions about exposure that are used in the calculations. In this study, we assumed that 10% of the produce that people eat over an 80-year lifetime comes from a Yellowknife garden and that ranges from less than 1 serving to 2 servings of vegetables each day (depending on age). We assumed that the other 90% is eaten as supermarket produce. We compared this blended diet scenario to one where only the supermarket produce is eaten. For example; we compared 100% of the carrots over a lifetime from the supermarket to 90% of carrots from the supermarket and 10% from a Yellowknife garden.

The results show that there is VERY LOW RISK of cancer associated with consuming garden produce from Yellowknife, although the blended diet scenario gives values that are 2 to 4 times higher than when eating only supermarket produce. This level of risk is comparable to risks that people experience as a part of everyday life, like the risk associated with living in a place like Calgary that is higher in elevation and is associated with higher terrestrial radiation.

Q. Why was the risk assessment done for a blended diet, where 10% of produce intake comes from Yellowknife gardens?

A blended diet was used so that we could compare risk to a similar scenario where only supermarket vegetables are eaten. A rate of 10% of garden vegetable consumption over a lifetime was used because this is a standard amount used in the development of residential soil guidelines, and is used in preliminary stages of risk assessment.

We recognize that not all people eat garden produce at this rate, and we are trying to find out more about produce donors' consumption rates as part of year 2 of the study. Produce donors can provide their consumption data to us on an entirely voluntary basis.

Q. What do the risk levels mean and how were they decided

There are many factors that contribute to cancer risk in Canada, with the total lifetime cancer risk currently at 45% for men, and 43% for women (Canadian Cancer Society 2021). In human health risk assessment of environmental contaminants, Health Canada considers the added (incremental) lifetime cancer risk to be ***negligible*** if it is less than 1 in 100,000, meaning that a miniscule amount of risk is added (for 1 in 100,000, the risks for men and women become 45.001% and 43.001%. However, there are factors than can pose risk above this amount: for example the lifetime cancer risk from outdoor exposure to radon is 1 in 100 (Health Canada 2018). For this reason, risk assessors and communicators define levels of risk that may not be negligible, but can help us understand the scale of risk.

We defined ***very low*** risk as between 1 and 10 in 100,000, and ***low risk*** as between 10 and 100 in 100,000. Everyday exposures that may be experienced that are in the very low and low risk categories include are living in Calgary for a year, drinking a light beer every day for a year, and

ordinary outdoor exposure to terrestrial radiation (The Risk Communication Institute 2001, Government of Alberta 2020, X-ray Risk 2018).

GENERAL INFORMATION

Q. What is the Yellowknife Garden Metals Study?

This study collects important information on the amount of arsenic and other mining-related contaminants in backyard garden soils and produce. The information will be used in an independent risk assessment for the consumption of garden produce.

Q: Why might garden produce and metal contamination be a concern to residents?

Recent studies have shown that soils in the Yellowknife area have been impacted by past mining emissions, and concentrations of arsenic are higher near Yellowknife than other parts of the country, particularly near Giant and Con Mine. Many residents have gardens or use soil from areas that have been impacted by past mining emissions, either sourced through local contractors or from their own properties. Therefore, it is important to evaluate the levels of arsenic in garden soils and produce and to evaluate the risk associated with eating vegetables from local gardens.

Lakes and landscapes have been impacted by past mining emissions in the region. It is important to collect the necessary information so that decisions related to metal exposures and health risks in the region are based on the best available evidence.

Q. Why now?

There are several new agricultural initiatives in the Yellowknife area, including people selling produce from local gardens. Resource managers and health authorities need to understand the levels of arsenic and other metals in garden produce to best support these new agricultural initiatives.

Q. Who is behind the study?

This project is a joint initiative between the Aurora Research Institute, the Royal Military College (RMC), Queen's University and the Yellowknives Dene First Nation, with financial support from the GNWT Department of Environment and Natural Resources.

Q. What is the purpose of the YK Garden Metals Study?

The purpose of the project is to gain a better understanding of the levels of arsenic and metals in garden produce from Yellowknife, Ndilo, and Dettah. This will allow the project team to compare current and past levels in Yellowknife and levels from other parts of Canada and the world. We are also interested in investigating how different types of produce take up arsenic from the soil and

what types of arsenic are present in Yellowknife garden soils. The information from the study will be used in a risk assessment to determine if the consumption of garden vegetables presents a health risk to residents.

Q. Why should this study matter to me?

If you are concerned about your exposure to arsenic and other metals from local garden produce, this project will provide you and other residents an understanding of the current exposure to arsenic and other contaminants of concern. If you participate in the study, you will receive your individual results and what those numbers mean. In addition, your involvement will contribute to the overall assessment of metal levels in local food sources, which is an important part of future health effects and risk assessment work.

Q. Hasn't this been done before?

It has been almost 20 years since a study like this was completed. In 2001, a study from the Environmental Sciences Group at Royal Military College looked at arsenic in garden vegetables from eleven gardens in the Yellowknife area. This study found that produce from YK gardens had higher levels of arsenic than national averages.

Many people use garden produce to supplement their diet and there is a growing interest in commercial agriculture in the Yellowknife region. In the time since the last study, we now recognize that soils within close proximity to Yellowknife can have soil arsenic concentrations far exceeding national guidelines for residential and agricultural use. The new study included more garden plots and collected a broader spectrum of vegetables from the gardens.

As residents get soil from a variety of sources, including bagged soil from hardware stores and local soil quarries, it is important to understand the range of arsenic levels in garden soils, where these soils are derived from, and how this impacts levels in garden produce.

Q. How was the study done?

We tested garden soils and unpeeled vegetables for a range of metals including: arsenic, antimony, and lead, and compared the concentrations to existing Canadian residential guidelines for soils and to a national total diet study (TDS) undertaken by Health Canada (Health Canada 2021) for metals in vegetables. The TDS included produce collected from supermarkets across Canada, between 2005–2018 (the most recent data). The range of values from the TDS is an indication of levels in supermarket produce rather than a guideline value above or below which there are concerns about consumption.

Q. I am still concerned about levels of arsenic in my garden. How can I limit my exposure?

We recognize that residents may still be concerned about levels of arsenic in their garden soil and produce. There are some simple ways to reduce your exposure to arsenic from your garden soil and produce. These include washing your hands after gardening and washing garden produce well before eating. You can also peel root vegetable prior to cooking and eating to reduce the amount of soil on your produce.

Don't forget, there are many benefits to growing and eating produce from Yellowknife gardens. We found that some nutrient levels were higher in Yellowknife produce than the national supermarket survey. Specifically, calcium, iron, potassium and zinc in Yellowknife vegetables were up to 22 times higher than the amounts in supermarket vegetables. There are also mental health benefits from spending time outdoors and producing your own food.

Q. Is there more information about arsenic in the Yellowknife area and what this means for me and my family?

The Yellowknife Health Effects Monitoring Program (YKHEMP) (www.ykhemp.ca) collected urine and toenail samples from Yellowknife residents. The results from the YKHEMP study showed that levels of arsenic in the Yellowknife population were not elevated compared to those in the general Canadian population. This gives us further confidence that arsenic exposure through eating garden produce presents a very low risk for Yellowknife residents.

Additional information about arsenic is available through The Department of Health and Social Services and Environment and Natural Resources.

Department of Health and Social Services
https://www.hss.gov.nt.ca/en/newsroom/arsenic-lake-water-around-yellowknife

Department of Environment and Natural Resources
http://www.enr.gov.nt.ca/en/services/monitoring-legacy-arsenic-yellowknife-area

Human Health and Ecological Risk Assessment for Yellowknife, Ndilo and Dettah related to cleanup of the Giant Mine
https://www.aadnc-aandc.gc.ca/eng/1540244275340/1540244382141

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