south river SCIENCE TEAM FACT SHEET
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Eating Vegetables Grown on the South River Floodplain

The soil in a garden is central to a successful harvest because it delivers nutrients and water to plants. *Although the soil in the floodplain in the South River has elevated mercury, South River Science Team research has shown that eating vegetables grown on the South River floodplain is not expected to be a health concern.*

From Waynesboro to Port Republic, flooding has deposited river sediment containing mercury in South River floodplain soil. (The floodplain is land adjacent to the river that experiences periodic flooding.) Although scientific literature has shown that mercury in soil does not migrate in significant amounts into garden vegetables, the Science Team has been studying the floodplain soil along the South River with the goal of evaluating mercury uptake from the soil into garden vegetables and human exposure from eating these vegetables.

This Fact Sheet summarizes the mercury levels measured in the vegetables and how that information was used to assess the potential for human exposure from eating them.

The Plan

The garden study spanned two years (2003-2004) and covered two growing seasons. The Science Team planted two vegetable gardens near Crimora, Virginia, at the Augusta Forestry Center. The Forestry Center is about 10 miles downstream from Waynesboro along the South River. One garden was located near the river in an area that floods frequently; the other was located in an area away from the river that has not flooded for at least 100 years. The floodplain garden served as the test area, and the second garden served as the control or reference area. Soil in the floodplain garden contained elevated mercury levels as high as 78 parts per million (ppm). Soil in the reference garden was less than 0.2 ppm, which is in the range of background levels. Fact Sheet No. 3, Summary of South River Floodplain Soil Survey, provides a more detailed description of mercury levels in the South River floodplain, including background levels in soil.

A rototiller is used to mix the limestone and fertilizer into the soil and prepare the land for planting at the control garden.

The Science Team collected a total of 238 vegetable samples (175 from the floodplain garden and 63 from the control garden) from 17 different vegetables. All samples were prepared for eating as if they were from a home garden. The vegetables grown are listed below.

The Science Team collected 238 samples from these vegetables at the two gardens at the Augusta Forestry Center.

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All vegetable samples were analyzed for mercury. The Science Team performed a conservative evaluation of potential human exposure to floodplain vegetables by incorporating several assumptions intended to overestimate mercury in the diet. For example:

» It was assumed that all vegetables in a person's diet were grown on floodplain soil.

» The amount of each vegetable a person would consume was deliberately overestimated.

» The maximum amount of mercury detected or the detection limit (if mercury was not detected) was assumed to be present in a particular vegetable.

Then, the team calculated the amount of mercury an individual would ingest from eating a particular vegetable (corn, for example) over an extended period of time. This amount was compared to the amount of mercury considered acceptable for ingestion by the U.S. Environmental Protection Agency (USEPA). The Science Team repeated this calculation for all of the vegetables from the floodplain garden during both growing seasons.

The Results

Mercury was not typically found in garden vegetables (i.e., greater than 90% of vegetables had levels below what could be measured). When mercury was detected, the maximum amount detected was below 0.2 ppm. Similarly, mercury was not typically found in the reference garden vegetables. When it was measured, the maximum amount was less than 0.04 ppm. Even assuming that a person consumed large amounts of vegetables grown only on the floodplain and containing the maximum levels of mercury (measured or assumed), the results show that the amount of mercury a person would ingest from eating vegetables grown on the South River floodplain is below the USEPA-acceptable reference dose for mercury. So, although the soil in the floodplain in the South River has elevated mercury, South River Science Team research has shown that eating vegetables grown on the South River floodplain is not expected to be a health concern.

Landscape fabric was placed over the soil to control weeds.

This photograph shows the floodplain garden, which served as the test area.

Contacts

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The Virginia Department of Environmental Quality and others have been monitoring mercury in fish, water, sediment, and soil in and along the South River and South Fork Shenandoah River since its discovery in the 1970s. Mercury was released to the South River as a result of past practices at the former DuPont plant in Waynesboro, where mercury was used from 1929 to 1950.

In 2001, the South River Science Team was formed to serve as a focal point for technical issues concerning mercury in the South River and downstream waterways. The Science Team is a cooperative effort between the Virginia Department of Environmental Quality, Department of Health, and Department of Game and Inland Fisheries and representatives from academia, citizens groups, the USEPA, and DuPont.