

Soil-Hg Interactions with Crops and Vegetables

South River Science Team Meeting

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Assessment Overview

- Floodplain Land-use Appraisal
- Floodplain Hg Survey
 - Improve understanding of river sediments/floodplain soils dynamics
 - Identify sources of soils for greenhouse study
 - Identify sites for field study
- Greenhouse / Garden Experiments
 - Determine if soil-Hg is taken-up via the roots of vegetable crops in sufficient levels to be a health risk

Greenhouse and Garden Experiments

- Study Objectives
 - Determine if soil-Hg is taken-up via the roots of vegetable crops in sufficient levels to be a health risk
 - Greenhouse Study
 - Well-controlled conditions; water, light, fertilization, temperatures, homogenized soil, control pests
 - Garden Study
 - Can include larger number of crops
 - Relevant to potential exposures

Soil/Site Selection Criteria

- “Representative” Site/Soil
 - Representative range of Hg content
 - Representative soil characteristics
 - Currently supports plant growth
- Soil-Hg levels
 - Collect from surface to 30-cm depth(?)
 - 0 to 15 cm and 15 to 30 cm(?)
 - Pair any greenhouse study with garden sites

Soil Characterization

- Mercury content
 - Total Hg
 - Extractable and available
 - Physical/chemical speciation
- Other constituents(?)
 - Se, etc.
- pH
- Texture/Clay content
- Soil Organic Matter Content
- CEC, plant available nutrients

Crops to Study

(Root Crops)

- Beans (pole, bush)
- *Beets*
- Broccoli
- Cabbage
- *Carrots*
- Cucumbers
- Edible pod peas
- Green bunching onions
- Head lettuce
- Onion storage bulbs, shallot
- Peppers
- Potatoes
- Radishes
- Spinach
- Summer squash
- Sweet corn
- Swiss chard
- Tomatoes
- *Turnip* (greens & roots)

D. Relf and A. McDaniel, 1996. Vegetable planting guide and recommended planting dates. Va Cooperative Extension. Pub. 426-331.

Vegetable Analysis

- Fresh and dry weights
- Preparation for analysis
 - Above-ground
 - Unwashed and washed
 - Root crops
 - Washed; washed and unpeeled; washed and peeled
beets, carrots, onions
- Digest and measure total mercury
- Check for soil contamination
 - Determine elements in high amounts in soil but not taken up by plants
 - Titanium and/or Aluminum

What is needed. . .

- Place to study and work
 - ✓ Augusta Forestry Center, Crimora
- Assemble and assimilate available information
 - ✓ Site history, irrigation, safety and security
 - ✓ Maps, soils, river proximity, land availability
- Develop a soil sampling plan for soil Hg
 - ✓ Identify areas to sample
 - Collect soils and analyze
- Decision Point
 - Is this an appropriate place to work?
 - Initiate studies