



Cornell University
College of Agriculture and Life Sciences
Department of Crop and Soil Sciences

Contaminants in Soils: An Overview of Key Topics

**Cornell Waste
Management Institute**



Overview of key topics:

- Importance of soil health for plants and garden users
- Goals of garden sampling
- Logistical details for sampling garden soils
- Interpreting test results
- Best management practices and strategies to reduce exposure



Soil testing can provide information to help improve the quality of your garden and the health of your community.



Soil quality is affected by land use and nearness to pollution sources.

Common sources of soil contaminants

Paint (before 1978):	<i>lead</i>
High traffic areas:	<i>lead, zinc, PAHs</i>
Treated lumber:	<i>arsenic, chromium, copper</i>
Burning wastes:	<i>PAHs, dioxins</i>
Manure:	<i>copper, zinc</i>
Coal ash:	<i>molybdenum, sulfur</i>
Sewage sludge:	<i>cadmium, copper, zinc, lead, PBTs</i>
Petroleum spills:	<i>PAHs, benzene, toluene, xylene</i>
Commercial / industrial site use:	<i>PAHs, petroleum products, solvents, lead, other heavy metals</i>
Pesticides:	<i>lead, arsenic, mercury (historical use), chlordane and other chlorinated pesticides</i>

The ways through which people are exposed to soil contaminants will vary with the specific contaminant, with the site conditions, and with people's behaviors.

Exposure usually occurs through:

- **Accidental consumption of soil** while working, gardening or playing (children may eat soil).
- **Consumption of fruits and vegetables**, animal products, or water that have contaminants on/in them.
- **Skin contact** - some chemicals (many pesticides) can easily pass through the skin and enter the body.
- **Inhaling contaminants** with soil dust or that vaporize from soil.

Soil testing can provide more information about contaminant levels or other soil properties.

What is the best sampling strategy to gather information about your garden?

There is no one-size-fits-all strategy.

The best sampling strategy will depend on your particular situation, and what questions you'd like the test results to help answer.

Some things to think about:

- Site history (*and how might it affect your soil*)?
- Location (*nearness to pollution sources*)?
- Overall soil quality (*pH, organic matter, etc.*)?
- Site use (*growing food, children's play*)?
- Size (*how many samples will you need*)?
- Variability (*soil quality or contaminant levels may be different across the site*)?

And, think about the goals of soil sampling:

For example,

- Do you want to measure the average levels of contaminants or other soil properties?
- Do you want to collect information to help you develop the best layout for your garden?
- Do you have concerns about soil quality in a particular location?
- Other questions / concerns?

What would sampling strategies look like for different sites?

How should soil samples be collected?

For example:

- To measure soil properties in specific locations, collect separate samples of the top 1-2" of soil from these areas.
- To measure average levels in surface soil, collect composite samples of the top 1-2" of soil across the site.
- In garden soils, collect deeper samples (top 6") from several locations in the garden and mix them together.

Collect separate samples to find out if some parts of the garden are different than others.

Finally, what do soil test results mean?

- Laboratory results report the amount of a particular substance (*lead, etc.*) measured in a soil sample
- Measures of soil properties can help people decide if changes in land use, gardening practices, or other behaviors might help create a healthier garden.
- There is no single standard for acceptable levels of soil contaminants, but some guidance is available from state and federal agencies, and other sources.

What steps can help protect your health and create a healthy garden?

- Wash hands / wear gloves when working with soil.
- Keep soil from coming indoors on shoes, pets, or clothing.
- Avoid or contain contaminated areas: use raised beds for gardening, or mulch to reduce dust.
- Add clean soil or organic matter, adjust soil pH, promote good drainage.
- Wash produce well, and peel root crops.
- Avoid or limit activities that can increase soil contamination, such as the use of certain fertilizers.

For updates as our project progresses, visit:
<http://cwmi.css.cornell.edu/soilquality.htm>

See our “Resources for Healthy Soils” for more information.



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