



## Lead in Garden Soils

### INTRODUCTION

We don't usually think of our gardens as dangerous or toxic, but unfortunately, some garden soils do contain moderate to very high levels of lead. Garden soils contaminated with lead pose a serious health risk. The risk is primarily from contaminated soil brought into the home on clothing, shoes and tools. The soil becomes mixed with housedust that is inhaled or ingested. This can result in dangerous increases in blood lead levels, particularly in infants and toddlers. Lead may also be ingested from contaminated soil clinging to vegetable crops. However, lead uptake by plant roots and deposition inside edible plant parts is relatively low, even when soils have a high lead content.

### SOURCES OF LEAD

Chipping or peeling paint around older structures will raise the lead level in the soils directly adjacent to the building. Even today, when an old building is demolished, the soil can become contaminated with lead from old lead paint. In the 1950's, cheaper titanium pigments largely replaced lead pigments. Federal restrictions were not imposed until the late 1970's.

Soil can be contaminated with lead from several other sources - industrial sites, leaded fuels, old lead plumbing pipes, or even old orchard sites in production when lead arsenate was used as a pesticide. Lead accumulates in the upper 8 inches of the soil and is highly immobile. Contamination is long-term. Without remedial action, high soil lead levels will never return to normal.

### HEALTH RISKS

We do not require lead in our diet or environment. At very low levels that naturally occur in soils (10-50ppm), no detrimental health effects have been noted. But higher soil lead levels can raise the body's lead level without producing any obvious physical symptoms. Young children under the age of 6 and pregnant women are at the greatest risk. As a group, children exposed to lead have lower IQs and may experience permanent learning disabilities and behavioral disorders when compared to children not exposed to lead.

### SOIL TESTING

Testing for lead will help to evaluate the potential risk to health. The risk is based on exposure. Both private and university soil test labs can determine lead levels in soils. However, no legal regulations for soil lead levels are in effect.

Soil laboratory results will be returned listing the parts per million (ppm) of lead from either an extracted or total lead test, or both. Pay careful attention to the total lead values. The values in Table 1 will help you understand your test results.

**Table 1.**  
**Soil Lead Levels**

Relative Soil Lead Levels	Total Lead (ppm)
Low	0 - 499
Medium	500 - 999
High	1000 - 3000
Very High	above 3000

Soil samples should be taken from several areas to determine the location of the contamination. The greatest lead concentration is in the top 1 to 2 inches of soil. Children's play areas or vegetable gardens should be sampled separately. Avoid mixing several sites into one sample. Elevated lead levels are more common in urban neighborhoods. But suburban and rural soils may also be contaminated. All vegetable garden soils should be tested for lead. Young children should not play or garden in soils that have a total soil lead level above 300 ppm.

### REDUCING HEALTH RISKS

Gardeners can reduce the risk of lead poisoning from lead contaminated soils by following these recommendations:

- Don't locate food gardens next to a busy road or a home built prior to 1940 with a painted wooden exterior.
- Contaminated soil particles are more likely to cling to or become imbedded in leafy greens and root crops than on fruiting vegetables like tomatoes and cucumbers.
- Always wash all vegetables and peel all root crops before they are cooked and eaten. Remove the outer wrapper leaves of cabbage.

- Wash off excess soil from root and leaf crops outside the house, preferably at an outside hose bib, to prevent bringing contaminated soil into the home.
- Fruiting vegetables (tomato, pepper, cucumber) are less likely to contain high lead levels compared to leafy vegetables (lettuce, spinach) and root vegetables (carrot, turnip).
- The amount of lead absorbed by plants is affected by the soil pH, organic matter and phosphorus content of the soil, and total soil lead level. To reduce lead uptake by plants, adjust the pH of the soil to a level of 6.5 to 7.0. Add organic matter such as compost, manure, leaf mold, or grass clippings to the gardening site. Add phosphorus to the soil as recommended by a soil test.
- In heavily contaminated soils adjacent to a residence, plant trees, shrubs or perennials and mulch the area to keep the soil covered. Soil removal and replacement should be considered if the soil lead level is over 5000 ppm total lead.
- No food crops should be grown in soil that is heavily contaminated. Use containers for gardening or cover the soil with landscape fabric and fill 8 in. high raised beds with a mixture of clean topsoil (low in lead) and compost.
- Rinse and launder gardening clothing promptly. If possible, don't allow young children to play in contaminated soils. Frequent hand washing and rinsing outside toys will reduce the amount of soil ingested. Always wash hands before eating meals or snacks. Have family members leave outdoor shoes in a cardboard box at the door, to avoid spreading lead contaminated dust through the home. Mulch play areas with wood chips or other soft materials to reduce soil dust. Build a plastic lined sand box for a clean area to play.
- Parents of children under age 6 living in areas with contaminated soils should consult their physician. A blood test to monitor lead levels may be recommended.

We are increasingly concerned with environmental quality and the need to protect ourselves from toxins. Lead is another unwelcome environmental concern. For further information see the following websites:

- Environmental Protection Agency - [Lead in Paint, Dust, and Soil](#)
- Maryland Department of the Environment - [Lead Poisoning Prevention Program](#)
- University of Illinois at Urbana-Champaign Agroecology and Sustainable Agriculture, [Lead in Soils](#)
- Agency for Toxic Substances (CDC) [Lead Toxicity - What Are the US standards for Lead Levels?](#)

## SOIL TESTING LABS

The following laboratories will test soil for lead. This is by no means complete and is intended for reference only. *Mention of businesses in this publication does not constitute an endorsement by University of Maryland Extension.*

### Soil and Plant Tissue Testing

West Experiment Station  
University of Massachusetts Amherst, MA 01003  
<http://www.umass.edu/plsoils/soiltest/>  
Phone 413-545-2311

### A and L Eastern Agricultural Testing Laboratory

7621 White Pine Rd.  
Richmond, VA 23237  
<http://www.al-labs-eastern.com>  
Phone 804-743-9401

### University of Delaware Soil Testing Program

152 Townsend Hall  
531 S. College Ave.  
Newark, DE 19717-1303  
[http://ag.udel.edu/other\\_websites/DSTP/](http://ag.udel.edu/other_websites/DSTP/)  
302-831-1392

### Pennsylvania Agricultural Analytic Services

State University Laboratory  
University Park, PA 16802  
<http://www.aasl.psu.edu>  
814-863-0841

### Waters Agricultural Laboratories, Inc.

PO Box 382  
257 Newton Highway  
Camilla, GA 31730  
<http://www.watersag.com>  
229-336-7216

### Spectrum Analytic, Inc.

PO Box 639  
1087 Jamison Rd.  
Washington Court House, OH 43160  
<http://www.spectrumanalytic.com/>  
1-800-321-1562

Contact the individual lab for their procedures and charges before sending the sample.

**Authors: Jon H. Traunfeld and David L. Clement, Ph.D., Extension Specialists, Home and Garden Information Center.**

**Original Reviewer: Rufus L. Chaney, Ph.D., Research Agronomist (retired), Environmental Chemistry Laboratory, USDA, Beltsville, MD.**

3/01, revised 2/2010

**Have a home pest or garden question? Call the Home and Garden Information Center  
1-800-342-2507 [hgic.umd.edu](http://hgic.umd.edu)**