

# 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 (10-50 ppm), 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

Elevated lead levels are more common in urban neighborhoods, but suburban and rural soils may also be contaminated. 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. No legal regulations for soil lead levels are in effect. However, the most current U.S. Environmental Protection Agency recommendation is to avoid growing vegetables in soil with a total level above 400 ppm ([www.epa.gov/lead/protect-your-family-exposures-lead#soil](http://www.epa.gov/lead/protect-your-family-exposures-lead#soil))

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. All vegetable garden soils should be tested for lead. 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.

## 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 (lettuce, spinach) and root crops (carrots, turnips) 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.
- 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.
- Food crops should not be grown in soil that is over 400 ppm total lead. Use containers for gardening or cover the soil with 8 in. high raised beds filled with a mixture of clean topsoil (low in lead) and compost.
- 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. Rinse and launder gardening clothing promptly. Mulch play areas with wood chips or other soft materials to reduce soil dust.
- 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.

For further information see the following websites:

- Cornell Waste Management Institute - Healthy Soils, Healthy Communities Project (<http://cwmi.css.cornell.edu/healthysoils.htm>)
- US Environmental Protection Agency - Brownfields (Urban Agriculture) (<http://www.epa.gov/brownfields/urbanag/index.html>)
- US Environmental Protection Agency - Lead Safe Yards (<http://www2.epa.gov/lead>)

## SOIL TESTING LABS

The following laboratories will test soil for lead. This is not a comprehensive list and is intended for reference only. The *mention of businesses in this publication does not constitute an endorsement by University of Maryland Extension.*

### University of Delaware Soil Testing Program

152 Townsend Hall

531 S. College Ave.

Newark, DE 19716

<http://ag.udel.edu/dstp/>

302-831-1392

Lead included in basic "Home Lawn and Garden Soil Test"

### Soil and Plant Tissue Testing Laboratory

University of Massachusetts

Amherst, MA 01003

413 545-2311

<http://soiltest.umass.edu/ordering-information/>

Lead included in basic soil test

### Pennsylvania Agricultural Analytic Services

The Pennsylvania State University

111 Ag Analytical Svcs Lab

University Park, PA 16802

<http://agsci.psu.edu/aasl>

814-863-0841

Check the websites or contact the individual labs for their procedures and charges before sending the sample.

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

3/2001, revised 2/2010, 1/2013, 2/2014, 5/2018

**Author: Jon H. Traunfeld, University of Maryland Extension Specialist, Home and Garden Information Center**

This publication is a series of publications of the University of Maryland Extension and The Home and Garden Information Center. For more information on related publications and programs, <http://extension.umd.edu/hgic>. Please visit <http://extension.umd.edu/> to find out more about Extension programs in Maryland.

The University of Maryland, College of Agriculture and Natural Resources programs are open to all and will not discriminate against anyone because of race, age, sex, color, sexual orientation, physical or mental disability, religion, ancestry, or national origin, marital status, genetic information, or political affiliation, or gender identity and expression.

For more information on this and other topics visit the University of Maryland Extension website at [www.extension.umd.edu](http://www.extension.umd.edu)