

COOPERATIVE EXTENSION



Washington State University

KING COUNTY

500 SW 7th Street, Suite A200
Renton, WA 98055-2983
206-205-3100/TTY-TDD 296-5242
FAX 206-296-0952
<http://king.wsu.edu>

HEAVY METALS IN THE GARDEN

Recently gardeners have become more aware of the health risks of eating vegetables grown where there are high levels of heavy metals. (They are called heavy metals because their atoms are heavy.) Lead, cadmium and arsenic can be present in our environment from many difference sources.

High lead levels usually can be traced to lead paint, lead pipes and motor vehicle exhaust. If the site once held a building, fence or other painted structure, paint flakes may have entered the soil. Our common use of wood here in the Northwest means that painted surfaces are also more common than in some regions.

The worst cadmium contamination in our area is near or downwind from the old Tacoma smelter. Cadmium in soil may also have come from car exhaust, commercial fertilizers and other sources.

Arsenic is another by-product of smelting metals. It also may accumulate where coal was burned or where arsenic-containing pesticides have been sprayed.

Now that we realize the danger, much less heavy metal contamination is happening. New paint and pipes don't contain lead. Unleaded gas is widely used. The Tacoma smelter is history and factories and coal-burning power plants are carefully engineered and closely monitored to minimize pollution. Fertilizers and pesticides don't add to the problem the way they did in the past.

Even sewage sludge, which often contained high levels of heavy metals, is usually relatively free of heavy metals now. Called "bio-solids" these days, sludge is finding many uses in agriculture.

Unfortunately, heavy metals contaminating soils from past activities don't break down or go away. If they are there, we need to learn how to deal with them.

What locations are most likely to have heavy metal problems?

- Site of a pre-World War II painted building, which has since been demolished.
- Site near a heavily traveled highway or main arterial.
- Site where cars were repaired or where a garage was located.
- Site of a former orchard or truck farm.
- North Tacoma, south Vashon and Maury Islands and, to a lesser extent, the Gig Harbor and Brown's/Dash Point areas.

Heavy metals are found naturally in all soils. They are only a problem where they are present in concentrations far exceeding normal background levels. Once you eat the heavy metal, it can accumulate in the liver and other organs for many years. Ingestion of small amounts over a long period of time may build up to toxic levels.

Arsenic is less of a problem than the other two. It is not readily absorbed by plants. Dust stirred up from high arsenic soils may settle on plants. Careful washing, especially of leafy vegetables and peeling root vegetables will protect you.



Cadmium is taken up by vegetables, but it is likely to be a problem only in areas affected by the smelter. In these sites it is best to build tall, framed, raised beds for your edible crops. Fill them with soil brought in from outside the smelter fallout area. You can also grow the crops that are least likely to take up cadmium. These are fruit/seed vegetables (squash, tomatoes, peppers, beans, corn, and peas) and some root vegetables (beets, turnips, and radishes.) Leafy crops should be avoided and carrots and potatoes have also been shown to absorb cadmium.

Lead is the heavy metal that has been written about most, because it is the most likely to be present at elevated levels in garden soils. Before you develop a new food garden site, you may wish to have the soil tested. Unless the lead level is very high, you can still grow vegetables, if you reduce your risk in the following ways.

1. Locate your vegetable garden at least ten feet away from heavily traveled roads and old painted structures. It appears that past high levels of airborne lead may have settled on building surfaces and been washed off with rain. Consequently, all soil near foundations of old buildings in large cities should be suspected of high lead levels.
2. Lime your soil to keep the pH between 6.5 and 7.0. The soil acidity common in our region magnifies the problem, since a low (acidic) pH makes lead more available to plants.
3. Add lots of organic matter like composted yard wastes and composted manure.
4. Grow mostly fruiting crops (peas, beans, tomatoes, peppers, eggplant, squash, cucumbers, corn, etc.)
5. Discard old, outer leaves of vegetables before eating; peel root crops; wash all produce thoroughly. Research at

Cornell has shown that lead particles on the surface of plants (from dust) are easily removed with a 1% vinegar or dishwashing detergent solution. (A 1% solution is approximately 1 tablespoon per 1-1/2 quarts of water.)

6. Wash hands well after gardening, especially before eating. Make sure small children do not eat garden soil.
7. Dig your beds deeply, so that more root growth can happen in the lower, less-contaminated, levels of the soil.
8. Keep dust and dirt contamination down by using organic mulches around your vegetables.

According to University of Massachusetts a lead level of less than 33 ppm extracted (500 ppm estimated total lead) is low and no danger, if good gardening practices are followed. At 33-110 ppm extracted (500 to 999 ppm estimated total) the level is medium. Pregnant women and young children should avoid soil contact. If there is knowledge/or suspicion of lead exposure and ingestion, contact your physician or local health department for guidance.

For high levels (110-857 ppm extracted/ 1000-3000 estimated total) do all of the above and grow only fruiting crops. Think about using containers or raised beds filled with clean topsoil mix.

(Note: For information about soil testing, send a self-addressed, stamped, business-size envelope to WSU Cooperative Extension, King County and ask for factsheet #6, "Soil Improvement.")