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## **Heavy Metals in the Soil and Garden**

When you hear the words ‘heavy metal’, you might have images of big hair, tight pants, steel guitars, and loud music. But when it comes to heavy metals in soil, it hits on a completely different bassline. The vast majority of the time heavy metals in soil aren’t an issue and homeowners don’t need to be concerned. However, when getting outside this spring to work in gardens and flowerbeds, the possibility of contamination increases. The coal mining, zinc processing, and oil refining past of in the corners of Kansas, Oklahoma, and Missouri have created areas of concern, most of which have been identified. Although once those heavy metals are dug up, it is hard for them to be contained. Large areas have elevated heavy metal concentrations but are well below any environmental threshold or health risk. Oddly enough, the few times I’ve help homeowners address heavy metals in their soils, it likely came from lead paint off an old house rather than any nefarious industry. This article is not meant to cause alarm and the chances of contaminated soil is very unlikely unless there is a reason to believe it is an issue.

### **Heavy Metal – Lead.**

Lead occurs naturally in the soil and typically below 50 ppm but is also the most common type of urban soil contaminant. At this level, it is perfectly safe to use as garden soil. According to the EPA, anything below 150 ppm is a very low concentration of lead, 150 to 400 is low, 400 to 1,000 is medium, over 1,000 is high to very high. Like all soil metals, lead bio-availability is controlled by soil pH. Acidic soil below 6.0 pH, lead is less tightly held in various compounds and its solubility is increased. Soil above 6.5 pH, lead is more likely to be complexed onto clay surfaces and organic matter.

Kids are generally more at risk with it comes to lead. Lead can interfere with calcium absorption and cause brain and kidney damage. While everyone can be effected by lead, young children are more likely to consume lead because they put their dirty hands or old lead painted objects in their mouths. Adults and children can also ingest lead from dust in the air or soil stuck onto eaten vegetables. The plants themselves are unlikely to contain lead as plants do not intentionally adsorb it. Only in high soil concentrations, with the help of acidic soil, do plants become contaminated with lead. Besides the soil, lead can come from water in old pipes.

Beyond industrial or mining possibilities, areas of the most concern are directly around the base of older homes due to lead paint being scraped or chipped off and also right along roadways due to the lead that used to be added to gasoline before the 1980s. Lead can be tested with a regular soil test sent to a soil testing lab like K-State's. Lead is immobile in the soil and is likely concentrated in the top two inches. If the soil is in the risk zone, mitigation efforts could include adjusting soil pH, limiting kid and garden activity, and planting perennials with mulch or grass so the soil won't be disturbed.

#### Heavy Metal – Arsenic, Cadmium, Chromium

Arsenic, Cadmium, and Chromium are all less likely to be present in the soil, but there are some places that they can be an issue. Arsenic and chromium are similar to lead in that they are immobile in the soil, natural in nature in low quantities, and non-nutrient to plants that are only unintentionally absorbed. Most contamination from these heavy metals again come from direct soil ingesting or drinking water. Arsenic used to be a common chemical found in pesticides which is how it could get into food supplies. Some countries with less environmental regulation might still use some of these inorganic arsenic compounds. Chromium comes from types of metal alloy or steel manufacturing.

Cadmium however, is one that plants do adsorb. It is not a plant nutrient but can be found naturally in water (generally in very low quantities). It can also be found in polluted air. In some areas of the world, like Japan, ground water has naturally high levels of cadmium and years of irrigation has brought this to the surface. Cadmium has various industrial uses like batteries and plating. Unfortunately, like lead, cadmium is a heavy metal associated with the zinc mining in far southeast Kansas and southwest Missouri. The majority of people still don't need to worry about this in their garden soils.

If anyone is interested in testing their flowerbeds, garden soil, or kids play area for heavy metals, please call your local K-State Research and Extension office for more information or to pick up a soil probe. References for this article came from PennState University, Soil Science Society of America, EPA, and CDC. Please reach me at 620-724-8233 or email [jcoover@ksu.edu](mailto:jcoover@ksu.edu).

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