
GARDEN SAFE GARDEN WELL

An Urban Gardening Guide

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Center For Urban Health / IUPUI
Indianapolis, IN
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TESTING YOUR SOIL



Why Should I Be Careful When I Garden In The City?

Gardening is fun, healthy, and can be extremely safe, even in cities. Soil in urban areas is like soil in the countryside in that it is full of nutrients and is the foundation of any garden. However, urban soils often contain high amounts of lead and other heavy metals. These contaminants are harmful to human development and are especially dangerous to children. For example, lead can cause permanent decreases in intelligence and increases the likelihood of attention deficit disorder and aggressive behavior, especially in children.

You should test your soil to learn if you are at risk for lead exposure. Then, you can take the appropriate and simple steps to safely garden. Although lead is not the only contaminant of concern in urban soils, it is one that is most closely linked to wide-scale human health impacts. When you garden, you are working the soil, your produce is in the soil, and your kids may be playing in that soil. All of these activities increase exposure to potentially harmful amounts of lead.

Why Is There Lead In The Soil?

Emissions from industrial activities, lead-based paint from older homes and commercial buildings, and lead from combustion of leaded gasoline all put lead into the atmosphere. The soil then acts like a sponge, absorbing and accumulating decades of harmful lead in the surface layers—typically, the top 4-6 inches of soil. The lead then stays in the soil. So, even though lead-based paint and leaded gasoline are no longer used, the lead released long ago is still in the upper soil layers. This is especially dangerous because gardening utilizes this very portion of the soil.



So, Is It Dangerous To Garden?

No! Although it may seem scary and intimidating, lead in your soil is no reason to stop gardening. In fact, with the proper steps not only will your garden be safe, but also your entire backyard will become a healthier environment. There are two simple steps for safe gardening – test your soil and then take the proper action if necessary.



How To Test Your Soil

ITEMS YOU WILL NEED

- + Ziploc bags – 5 sandwich or snack size and 1 gallon size (a plastic grocery bag works too)
- + Permanent marker
- + Trowel or scoop
- + Large mailing envelope with address

PROCEDURE

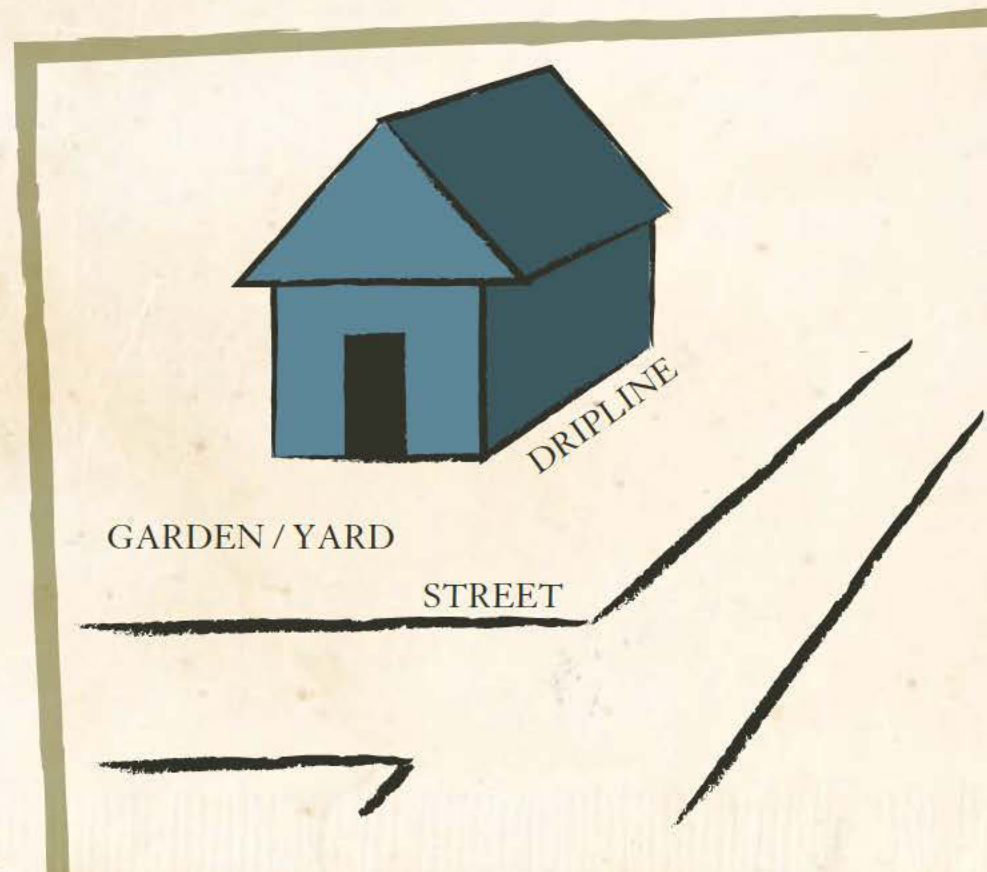
- + **Plan.** Test results may take 4-6 weeks; so plan ahead! In colder areas, the ground may be frozen in the winter. Consider...consider collecting samples in the fall, which not only will allow for easy sampling, but also will give you time to follow any necessary steps to ensure safe gardening.
- + **Decide where you will sample.** You want 3 samples from in and around your planting area. Try to include one sample from near the road. Also include one sample from near your house, preferably from underneath the dripline (under the gutter of the house). This will yield a total of five samples.

+ **Label.** Label your 5 bags with permanent marker. Write your name, street address, zip code, email if you have one, and the location of where the sample will be taken from, such as “tomato bed” or “SW corner of garden.”

+ **Sample.** Use a hand shovel or scoop to obtain soil from the surface to a depth of 4 inches. You want enough soil to fill one handful or about one Ziploc snack baggie. Therefore, if you use a quart size bag, it will not be halfway full. Place soil in corresponding labeled bag.

+ **Collect.** Put all of your sample bags in one larger bag, the 1 gallon size Ziploc or plastic grocery bag. Don't worry, you can't take a bad sample. Sticks, grass, or small stones in the sample will be removed before testing.

+ **Send.** Mail samples to a testing lab for testing (see Resources page for more details).



Understanding Test Results

Now what? After testing is complete, you will receive an email message or a letter describing your results in detail with specific recommendations for gardening. The concentration of lead and other heavy metals will be indicated in parts per million (ppm). Lead is naturally present in soils, at levels of about 10 – 30 ppm. However, much higher levels are very common in urban areas.



FOLLOW THESE RECOMMENDATIONS BASED ON YOUR LEAD LEVELS:

LESS THAN 200 PPM – Although it may be alarming to have values near 200 parts per million, these levels have not yet been linked directly to negative health outcomes, and are considered safe for gardening. If you find less than 200 ppm in the garden but higher levels in other parts of the yard, like under the dripline or near the road, cover these higher lead soils with some sort of ground cover or mulch. This prevents contaminated dust from blowing onto your plants and food. If this area is already covered with grass, mulch, clover, or any other ground cover, you do not need to do anything more.

200-400 PPM – Build raised beds as described on the next page. Mulch areas between and surrounding (10 feet) your new raised beds to keep the lead where it is and away from your garden.

400-600 PPM – Build raised beds and mulch as recommended above. Leafy green vegetables such as spinach, kale, cabbage, and lettuces should either not be grown or be washed thoroughly before consumption as they grow near the soil and have fine leaf hairs that trap soil particles. Root vegetables such as carrots, potatoes, turnips, radish, beets, and yams should be washed thoroughly and peeled because they grow deep, perhaps into the contaminated soil. Read more about leafy greens and root vegetables in the “Myth Busters” section.

MORE THAN 600 PPM – If your lead contamination exceeds 600 ppm consider relocating your garden or be prepared to significantly lower contaminants on a large scale, as it is likely that not only your yard, but the whole area has unsafe levels of lead.

The recommendations in this publication are only appropriate for the levels of lead they correspond to. Additional steps are necessary at sites with greater than 600 ppm lead and at former industrial sites.



BUILDING YOUR GARDEN

Building A Raised Bed

Not only do raised beds reduce lead exposure, they also provide optimal drainage, limit erosion, increase efficient water use, and can extend the growing season. The bed may be as long as you like, but consider making it only 3-4 feet wide to ensure easy access to all parts of the bed. There are many ways to build raised beds, each with its own cost and labor demand.



SUPPLY TIPS FOR MATERIALS

- + Save cereal boxes, shipping boxes, packaging boxes, and any other cardboard you can find. Check with grocery stores, bike shops, or any big box store (such as Wal-Mart or Target), or Craig's List to find more cardboard.
- + Ask farms for old straw.
- + Ask grocery stores, co-ops, and neighbors for fruit and vegetable waste.
- + Ask trash, landfill, or tree trimming companies for compost (some create compost from collected leaves) or build your own compost system.
- + Ask local garden stores for fertilizer, worms, and top soil.

Lasagna Beds

Be sure to cover the entire area from edge to edge with each layer.

LAYER 1 – CARDBOARD

2-3 layers, the more weeds you have the more cardboard. Be sure to remove any tape or plastic.

LAYER 2 – STRAW

12 inches thick for the first layer and 6-8 inches thick for the second Layer.

LAYER 3 – GREEN ORGANIC MATTER

3-5 inches thick. This includes any produce that has just begun to go bad and egg shells (but never add eggs, meat, or dairy products). The smaller the pieces, the faster they will decompose and turn into rich soil. So, for example, break apart a whole head of broccoli.

LAYER 4 – FINISHED COMPOST OR LEAF HUMUS.

1 inch. Compost is organic matter that has already decomposed. Leaf humus is specifically leaves that have broken down. This may be purchased or you can create your own.

REPEAT LAYERS 2-4 AGAIN

LAYER 5 – WORMS

4-5 handfuls.

LAYER 6 – ORGANIC FERTILIZER (OPTIONAL)

Sprinkle at recommended rates. Read bags closely or ask a sales associate to ensure an organic fertilizer.

LAYER 7 – FINISHED COMPOST OR LEAF HUMUS

1 inch.

LAYER 8 – TOP SOIL

3-4 inches. If not purchased at a store, make sure that it has been tested for lead and that the lead levels are below 200 ppm and if you want to grow organically, be sure to read the bags carefully looking for synthetic compounds.

SIDES

Although not necessary, you may add sides to your bed to ensure that your bed stays in place. You may edge your beds with sides made out of reused lumber (red wood and cedar are rot resistant), concrete blocks, recycled plastic lumber, glass bottles (although dangerous if they break) or any other non-toxic material. Stay away from any treated wood because chemicals may leech. To cut down on costs always try to reuse materials you already have or that would otherwise be thrown away. Although a milk crate is not a traditional side, that does not mean it doesn't work! Get creative and use whatever you have on hand.

Lasagna gardening is like its namesake in that it builds raised beds by layering. It is best if these layers can sit for a month or as long as a season before planting. Add compost and cover crops to keep the soil in optimum shape.



Barrier Raised Beds

COVER THE GROUND WITH RECYCLED CARDBOARD

Save cereal boxes, shipping boxes, packaging boxes, and any other cardboard you can find. Check with grocery stores, bike shops, or any big box store (such as Wal-Mart or Target), or Craig's List to find more cardboard.

CREATE BEDS WITH EQUAL PARTS CLEAN SOIL AND AGED MANURE OR COMPOST

Each component is important, but the mix of both is more imperative. Depending on the type of soil in your region you may need more compost. For example, if your soil is high in clay you may need more compost. No garden can survive having been made only from aged manure or composted leaves. You want your compost or aged manure to be mixed evenly. Clean soil means soil that is not contaminated. Unless bagged, be sure to make sure the soil is clean. Utilize an all-purpose organic veggie fertilizer such as Espoma or Bradley to help correct any nutrient deficiencies. Check with trash service companies, your local landfill, construction companies, stables, fairgrounds, and any other related industry to see if they have any clean soil, aged manure, or compost they are willing to donate or sell at a low price. Purchasing in bulk and hauling compost, soil, or compost/soil blend is much cheaper than buying the equivalent by the bag. If not, you may build your own compost or buy soil from a local garden center. If you want to grow organically, be sure to read the bags of soil carefully looking for synthetic compounds. You can also grow in nontraditional raised beds like children's wading pools, old tires, sacks, or trash cans.

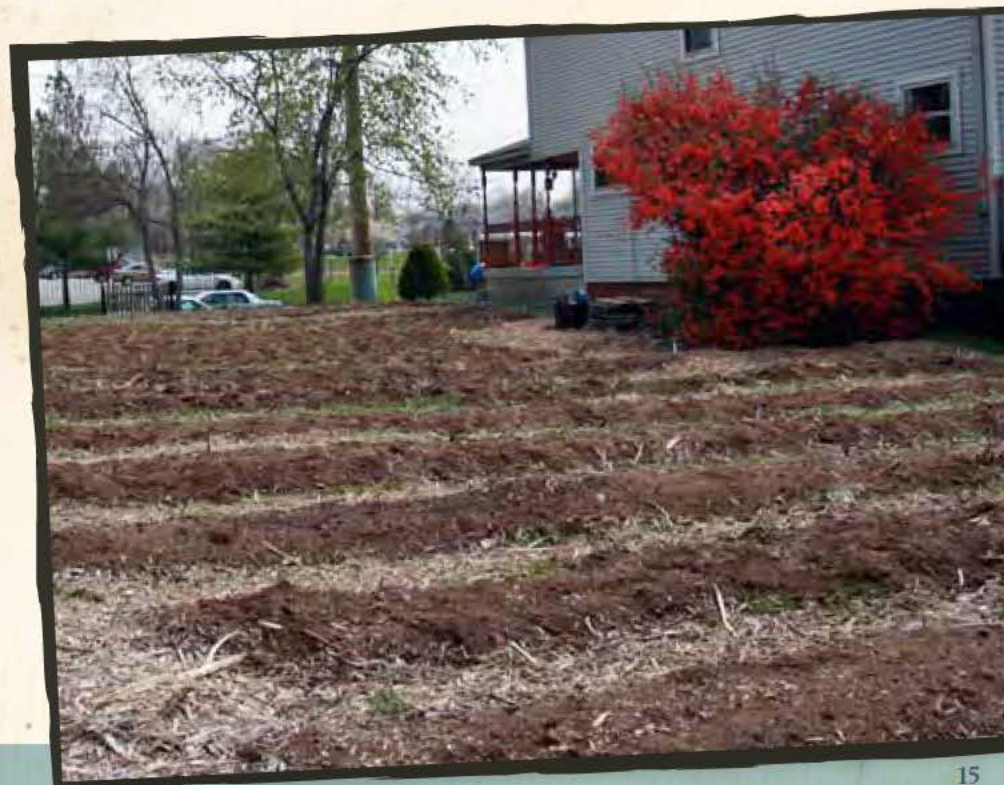
Raised Beds With Purchased Soil

BAGGED SOIL

You may purchase bagged soil from a local gardening store. If you want to grow organically, be sure to read the bags carefully looking for synthetic compounds. Based on past testing, these purchased soils seem to be very low in contaminants like lead and are safe to use.

MULCHING

Mulch over any land that has between 200-600 ppm of lead such as under a drip line, near the road, or any other highly contaminated area. This will ensure the soil, and lead, stays in place, not exposing you, your family, or your neighbors to the toxic compound. Although mulch is most often thought of as coarse wood chips, anything that will hold the soil in place works. You can use living mulch such as grass, ground cover, cover crops, flowers and other growing plants (that you won't harvest). Or, you may use fallen leaves, grass clippings (from a yard that has *not* been treated with weed killer), straw, coffee bean hulls, or compost. Some wood chipping companies may offer wood chips for free. Check with local companies!





TIPS & MYTH BUSTERS

Extra Safety Tips

- + One can never be too cautious!
- + If you are worried that you have been exposed to high lead, consult a physician.
- + Wet your land when it is quite dry to stop lead-rich dust from blowing in the air and potentially leading to exposure.
- + Wash produce thoroughly.



- + Put gardening clothes in a bag upon entering the house and wash these clothes separately.
- + Leave gardening shoes outside.
- + Wash hands and exposed body upon returning from the garden.
- + If your soil lead values are extremely high (above 1200 ppm), you can still successfully garden fruit trees or any tree crop. These do not carry lead to the produce.



Mythbusters!

FACT OR FICTION:

Leafy greens absorb heavy metals; so, it is unsafe to grow them...

One should avoid growing root vegetables when gardening near soils contaminated with lead...

Phytoremediation, using plants to remove toxic substances from the environment, is a possible means to removing lead...

It is safe to garden in an area that has tested positive for lead...

FICTION

As with leafy greens, some extra precaution is necessary, but that does not mean it is impossible to grow root vegetables such as carrots, radish, potatoes, turnips, beets, and yams. Even though you are growing in raised beds, these vegetables may grow into the deeper, contaminated soil. Therefore, wash them well and peel off the outer most layer. If the underlying soil has extremely high levels of lead (i.e., above 600 ppm), a few years of gardening before planting root vegetables is advised.

FICTION

Leafy greens such as spinach, kale, cabbage, and lettuces have fine hairs that hold onto soil, which is what contains the lead. Therefore, exposure to lead may be avoided by washing the leafy greens thoroughly. If you know you tend to only quickly rinse your produce to save time while prepping food, do not grow leafy greens. On the other hand, if you will thoroughly wash your leafy greens it is definitely safe to grow and consume them. If you are growing in raised beds there will be less direct contact with the contaminated soil, but it is still possible for lead-rich soil from other areas such as from underneath your dripline or a neighbor's yard to blow into your yard and onto your plants. So, always wash thoroughly regardless.

FICTION

Lead is not absorbed by plant tissue, and it does not become a part of the tissue. Some of the confusion arises because lead levels often decrease with gardening, but this is only because some of the soil, and therefore lead, is removed when produce is removed from the garden.

FACT

Taking the necessary steps such as building raised beds, mulching, washing produce well, and all of our other recommendations ensure a safe and successful garden.

Local Indianapolis Resources

Marion County Public Health Department offers free testing:

<http://www.mchd.com/newlead.htm>

Safe Urban Gardening Initiative offers free testing:

Safe Urban Gardening Initiative
c/o Dr. Gabriel Filippelli
Department of Earth Sciences, IUPUI
723 W. Michigan St.
Indianapolis, IN 46202

Purdue Extension Garden Tips

<http://www.extension.purdue.edu/gardentips/>

Indy Tilth provides local gardening resources

<http://www.indytilth.org>

National Resources

Cornell Nutrient Analysis laboratory provides many garden soil tests, including lead for ~\$14 per sample

<http://www.cnal.cals.cornell.edu/>

Go Gardening Guides

<http://www.gogardenguides.com/>

Organic Vegetable Garden Guide

<http://www.organic-vegetable-garden-guide.com/>

Soil Lead Risk Maps

<http://www.urbanleadpoisoning.com/>



This project is a contribution of the IUPUI Center for Urban Health, and is supported by gracious funding from the Indianapolis Foundation, a CICF affiliate