

Management of Soil Contamination

Urban agriculture is a new category of land use with different patterns of exposure than traditional agriculture – people are in closer contact with the soil than for any other category of agriculture, and for different time periods. While the definition of residential use is based on living, sleeping and eating in a dwelling on a property, the overall time and proximity to soil and potential contaminants make gardening and farming distinct from a residential or commercial use. A commercial-scale urban agriculture scenario would have yet another set of exposure criteria for the workforce and potential neighbors. While these risk scenarios still require refinement based upon additional research and policy discussion, it is clear that a separate category of use should be established for urban agriculture.

Reuse (the development of vacant lots for urban gardening) standards serves as a recognized policy barrier to implementing agriculture projects, but we also must recognize the health benefits from eating locally grown food and balance this with the manageable risk associated with using sites that may have soil contamination concerns.

Making health-related determinations about how to implement gardening and farming practices at a site must take into account: 1) specific knowledge about contaminants and human contact with the soil that occurs when preparing the site and during gardening/farming work; 2) during the periodic application of soil amendments, pesticides or other materials used in growing; and finally, 3) the uptake of contaminants by plants and any health risks that could be associated with using the plants as a source of food for people or livestock.

The high degree of variability in soils, limited control of public spaces and unique characteristics of how crops (species and variety, edible portions of plants) and humans respond (age, precautions taken) makes issuing blanket statements of safety virtually impossible. Plant uptake

of contaminants is a concern to urban gardeners and those who would like to include locally grown food on their menus.

While many of the uptake risks from urban soils can be controlled by demonstrated best management practices discussed in further detail below, ongoing research on plant uptake and bioavailability continues to bridge knowledge gaps.

Construct physical controls

Risk is based on the extent of hazard or contaminant present and the potential for exposure to the hazard. Actions to remove or reduce a hazard (amend the soil) and reduce exposure (cover the soil), reduce risks. Many good gardening practices, like adding compost and soil amendments, improve the soil while reducing the amount of contaminants and exposure to them.

- Build your garden away from existing roads and rail, or build a hedge or fence to reduce windblown contamination from mobile sources and busy streets.
- Cover existing soil and walkways with mulch, landscape fabric, stones, or bricks.
- Use mulch in your garden beds to reduce dust and soil splash back, reduce weed establishment, regulate soil temperature and moisture, and add organic matter.
- Use soil amendments to maintain neutral pH and add organic matter and improve soil structure.
 - Not all amendments are the same; be sure to choose the right amendments for your soil.
 - Keep in mind that each amendment type will have different application rates and techniques (e.g. rototilling), and may need to be maintained and reapplied annually.
 - Be sure to work with your local or state regulatory agency, and ask if your municipality provides free compost or mulch. Some amendments, such as Class A biosolids from sewage sludge, may be regulated under various regulatory programs.

Add topsoil or clean fill from reliable soil sources to ensure the soil is safe for handling by children or gardeners of all ages and for food production. Your state or local environmental

program, extension service, or nursery may be able to direct you to providers of safe soils, or to recommended safe sources for gardening soil. Remember, bagged or bulk soil (retail or wholesale) is not regulated by any agency so buyers should beware and always test the soil/compost.

- Build raised beds or container gardens,
 - Raised beds help improve water drainage in heavy clay soils or low-lying areas. They also create accessible gardening locations for many users and allow for more precise soil management.
 - Foot traffic should not be necessary in the bed, so the soil does not become compacted and soil preparation in the coming years is minimized.
 - Your state or local city agency may recommend using a water permeable fabric cover or geotextile as the bottom layer of your raised bed to further reduce exposure to soils of concern.
 - Raised beds can be made by simply mounding soil into windrows or by building containers. Sided beds can be made from wood, synthetic wood, stone, concrete block, brick or naturally rot-resistant woods such as cedar and redwood.

- Emphasize good habits.
 - Wear gloves and wash hands after gardening and before eating.
 - Take care not to track dirt from the garden into the house.
 - Clean produce before storing or eating
 - Peel root crops, and remove outer leaves of leafy vegetables.
 - Teach kids to wash fruits and vegetables before eating

Exposure to Soil Contaminants: Sources and Effects

In general, there are three ways in which people are exposed to contaminants in soil: ingestion (eating and drinking), dermal exposure (skin contact), and inhalation (breathing). People may accidentally ingest small amounts of soil during activities such as yard work, gardening, or playing. Ingestion also occurs when people eat garden produce grown in contaminated soil or groundwater. Some contaminants, such as pesticides, can be absorbed through the skin when

people come into contact with the soil. In addition, people can inhale airborne soil particles, such as dust, or contaminants that have vaporized from the soil after precipitation.

The possible health effects of exposure to any contaminant depend on the toxicity of the contaminant, the level at which it is present and how long and how often the exposure occurs. An individual's response to a given level of exposure to a particular contaminant is also affected by gender, general health and lifestyle, age, and inherited family traits. Information regarding the health effects of particular contaminants is available through the ATSDR (www.atsdr.cdc.gov/) and the EPA (www.epa.gov).

For additional information on how to take a soil sample or soil contaminates, contact the Jefferson County Cooperative Extension Service, Sarah Stolz (horticulture agent) or Wayne Long (ANR agent/coordinator).

Begin Farming

Whether it is a long-term or an interim use, simply greening a once-blighted or vacant property and improving the soil structure has real effects on the economic and social value of land and community health. It can also reduce the runoff of urban soil, silt and contaminants into stormwater systems by allowing greater infiltration of rain into soils improved with added compost and soil amendments. The ability to grow food or horticultural crops such as flowers or trees on this newly greened area will produce multiple beneficial effects to those who may farm it. Healthy eating, increased physical activity, reduction of blight, improved air quality and improved quality of life are all nearly immediate health benefits of urban agriculture.