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Lead concerns urban gardeners

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NEW YORK — Frank Meuschke's garden, which surrounds the house he rents in Brooklyn, is a bountiful source of tomatoes, snap peas, green beans, peppers, lettuce and multiple varieties of flowers. It is also, as he recently discovered to his dismay, a rich repository of lead. He had his soil tested last month, and the analysis showed more than nine times the amount of lead expected to occur naturally.

Meuschke, an artist who specializes in landscape paintings, is well aware of the dangers of lead paint. And he had suspected that paint scraped off houses in his neighborhood might have left lead residue in the soil over the years. "But I really didn't expect there to be that much," he said.

Harmful even at very low doses, lead is surprisingly prevalent and persistent in urban and suburban soil. Dust from lead-tainted soil is toxic to inhale, and food grown in it is hazardous to eat.

Health officials, soil scientists and environmental engineers worry that the increasing popularity of gardening, particularly the urban kind, will put more people at risk for lead poisoning if they don't protect themselves.

Thanks in part to the influence of the local-food movement and to economic considerations, more households in the United States plan, like the Obamas, to grow their own fruits, vegetables, herbs and berries this year — 7 million more households, according to the National Gardening Association, a 19 percent increase over last year.

While the increased physical activity and access to fresh produce promised by this trend are certainly healthy developments, widespread lead contamination means that many people are going to have to do more than wear gloves and sunscreen to garden safely. The presence of lead in soil doesn't mean gardening is out of the question, but it may require a change in plot design and choice of crops, and soil amendments.

"You won't know if you're at risk unless you test your soil," said Murray McBride, a professor of soil chemistry at Cornell University in Ithaca, N.Y.



County extension services as well as local public health departments often offer free soil testing or can recommend schools or companies that do it for a fee. Individuals generally mail dirt in sealed plastic bags for analysis. Meuschke paid \$12 to have his soil tested by the Environmental Sciences Analytic Center at Brooklyn College; some private companies charge as much as \$50.

The Environmental Protection Agency and Department of Housing and Urban Development advise (but do not require) remediation if lead levels in soil exceed 400 parts per million in children's play areas and 1,200 ppm elsewhere. But some states and cities have set much lower limits. For example, 100 ppm is considered hazardous in Minneapolis. In the Netherlands, 40 ppm is unacceptable. Unpolluted soil averages 10 ppm. Meuschke's soil had lead levels of 939 ppm.

Since 2003, hazardous amounts of lead have been documented in backyard and community gardens in New York as well as in Baltimore, Boston, Chicago, Detroit, Indianapolis, Los Angeles, Minneapolis, New Orleans, Philadelphia and Washington. Lead-laden soil has been found not only in inner city neighborhoods, but also suburban areas.

"It doesn't matter if you're rich or poor," said David Johnson, a professor of environmental chemistry at the State University of New York College of Environmental Science and Forestry in Syracuse, where he has found lead concentrations as high as 65,000 ppm in the yards of upscale homes. "Lead knows no socioeconomic boundaries."

Excessive lead in soil is the legacy not only of lead paint, but also of leaded gasoline, lead plumbing and lead arsenate pesticides. Although these products were outlawed decades ago, their remnants linger in the environment. Lead batteries and automotive parts, particularly wheel-balancing weights, are still widely used and are sources of soil contamination.

Soil is likely to contain high levels of lead if it is near any structure built before 1978, when lead-based paint was taken off the market, or if a building of that vintage was ever demolished on the site. Pesticides containing lead were often used on fruit trees, so land close to old orchards is also of concern. And beware of soil around heavily trafficked roadways; it, too, is probably laced with lead.

Environmental engineers and soil experts said any place is potentially tainted.

"It's kind of a dirty secret nobody really knows about because we're all distracted worrying about lead in toys from China," said Gabriel Filippelli, a professor of earth science at Indiana University-Purdue University in Indianapolis, who has published several papers on lead accumulation in soil. His and other research indicates lead levels in people's blood correspond directly to the amount of lead in the soil where they live.

"We have been unable to identify the threshold of lead exposure at which there is no risk to health," said Mary Jean Brown, chief of lead-poisoning prevention in the Healthy Housing Branch of the federal Centers for Disease Control and Prevention. "But we know the risk increases with increased exposure."

Fetuses and small children, because of their rapidly developing nervous systems, are more sensitive to, and suffer the most harm from, lead exposure. Adverse effects include damage to the brain and nervous system, lower IQ, behavior problems and slow growth. Adults may suffer cognitive decline, hypertension, nerve disorders, muscle pain and reproductive problems.

If soil is found to have high levels of lead, experts advise covering it with sod. Those who want to grow flowers or edible crops can either replace the contaminated soil or alkalize it by adding lime or organic matter such as compost. Soil with a pH level above 7 binds with lead, making it less likely to be absorbed by plants and the human body if the dirt is inadvertently inhaled or ingested.

The White House is mixing lime and compost into the soil for its kitchen garden, which according to a National Parks Service analysis has 93 ppm of lead — an amount above background levels but not considered hazardous to children or adults by the EPA's standards.

Filippelli recommends planting kitchen gardens with fruiting crops like tomatoes, squash, eggplant, corn and beans because they don't readily accumulate lead. Lead-leaching crops, he said, include herbs, leafy greens and root vegetables such as potatoes, radishes and carrots. Dirt also clings to these crops, making it hard to wash off and thereby increasing the risk of ingesting lead.



But some experts advise planting greens, specifically Indian mustard and spinach, for a couple of seasons as phytoremediation, or plant-based mitigation, before growing crops intended for food. By growing spinach for three months, researchers at the University of Southern Maine lowered the lead count in one garden by 200 ppm. Of course, the lead-leaching crop cannot be eaten or composted and must be disposed of as toxic waste.

A safer approach, particularly in areas where lead levels exceed 400 ppm, is to build raised or contained beds lined with landscape fabric and filled with uncontaminated soil. Luckily for Meuschke, many of his edible crops are in containers or pots filled with dirt bought at nurseries.



But lead dust blowing in the wind or rain splashing off lead-painted structures can sully food grown even in raised beds or containers. Situating gardens away from buildings is therefore a good idea, as is washing produce thoroughly with water containing 1 percent vinegar or 0.5 percent soap.



"It isn't that you shouldn't garden if you find lead in the soil, you just have to manage the space," said Edie Stone, executive director of GreenThumb, a division of the New York City Parks and Recreation Department that supports urban gardening. "You can't assume what you buy at the grocery store is any safer." Peanuts anyone?

WHERE TO HAVE SOIL TESTED

The Environmental Protection Agency's lead hot line,  (800) 424-5323 , can refer callers to health departments, which will either do soil testing or provide names of local certified labs.

County extension services can be found through the Web site of the Department of Agriculture's Cooperative State Research, Education, and Extension Service at csrees.usda.gov/Extension. They often do testing or can provide referrals to universities, colleges or private companies that do.

IN THE NEW YORK AREA Cornell Nutrient Analysis Laboratories, cna1.cals.cornell.edu,  (607) 255-4540 .

Brooklyn College Environmental Science Analytical Center, brooklyn.cuny.edu/pub/departments/esac,  (718) 951-5000 , extension 2647.

More information on health issues is available at the Web site of the Agency for Toxic Substances and Disease Registry, at www.atsdr.cdc.gov/toxprofiles/tp13.html. More on lead in the environment is at the EPA Web site at epa.gov/lead.
