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## A Hard Times Guide to Successful Vegetable Gardening

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### Problem Soils

Our back yards offer an abundance of places to grow our own food. However, your garden soil may hold some secrets that can affect your health and your desire to grow vegetables in your back yard. The amount of lead in the soil, the pesticides that may have been used on your lawn and the ability of many vegetable crops to absorb these materials might be a concern.

At high concentrations, lead is a potentially toxic element to humans. For this reason, there is a need to be concerned about elevated lead levels in the environment, particularly in metropolitan areas. Background concentrations of lead that occur naturally in surface agricultural soils in the United States average 10 parts per million (ppm) with a range of 7 to 20 ppm. Soils with lead levels above this range are primarily the result of lead contamination.

There are two major sources of lead contamination: 1) lead-based paint where contamination may occur when paint chips from old buildings mix with the soil; and, 2) lead from auto emissions. Studies conducted in urban areas have shown that soil lead levels are highest around building foundations and within a few feet of busy streets. Although lead is not currently used in paint or gasoline to any great extent, once lead has been deposited in the soil, it moves very slowly through the soil and can persist for a long time. Therefore, lead contamination of soils from these sources continues to be a concern.

To minimize absorption of lead by plants a number of control measures may be taken:

1. Maintain soil pH levels above 6.5. Lead is relatively unavailable to plants when the soil pH is above this level. If needed, add lime according to soil test recommendation. Lead is also less available when soil phosphorus tests are high. For information about obtaining a soil test, contact the UMass Soil and Plant Tissue Testing Laboratory, located on the campus of the University of Massachusetts at Amherst. Testing services are available to all and information on submitting a soil sample for testing is available at [www.umass.edu/plsoils/soiltest/](http://www.umass.edu/plsoils/soiltest/)
2. Add organic matter to your soil. In soils with high lead levels, adding one-third by volume organic matter will significantly reduce lead availability. Organic compounds bind lead and make it less available to the plant. When adding organic matter, the pH should also be maintained above 6.5. Good sources of organic matter include composted leaves, neutral (non-acid) peat, and well-rotted manure. Avoid leaf mulch obtained along highways or city streets as it may contain higher than normal lead levels.
3. Locate your garden as far away from busy streets or highways and older buildings as possible.

4. Because of the possibility of bare soil exposure to children through hand to mouth activity, soils with lead levels exceeding 100 ppm should not be used for gardening. If soil exposure to children is not a concern, then plants can be safely eaten from soils with soil lead levels up to 300 ppm.

Another concern is pesticides used primarily to kill pests that attack food crops, but in urban landscapes a variety of pesticides are used to control insect pests and manage weeds in lawns.

In general pesticides differ based on their active ingredients, which may include organochlorines, organophosphates and pyrethroids. After a pesticide is applied, it may meet a variety of fates. It may be lost to the atmosphere through volatilization, carried away to surface waters by run off and erosion or broken down by photolysis (chemical decomposition due to exposure to sunlight). In the soil, it may be taken up by plants, degraded into other chemical forms or leached into the soil. Pesticides that are insoluble or tightly bound to soil particles are most likely retained in the upper soil layers, but may be lost to surface waters through leaching and erosion. The potential surface loss of pesticide depends on pesticide properties, soil type and the length of time after application.

Generally, pesticides do not concentrate in fruits and vegetables, but there is the rare exception. Trace amounts of organochlorine pesticides, such as DDT and chlordane are no longer used, but still are present in some garden soils, can concentrate in the oily parts (usually the seeds) of some vegetables. Organochlorine levels found in these soils are usually very low, about a few parts per billion. Even when concentrated in seeds, levels are not generally considered a health risk, but exposure should be avoided if possible.

By their very nature, most pesticides create some risk or harm to humans, animals or the environment. Pesticide residue in the garden soils, although less of a concern, maybe an issue for some. If you have developed a new garden site and recent history of the site indicates chemical pesticides were used frequently, you might pause to think a bit. Remember that most pesticides break down quickly.

There are numerous private testing laboratories that test soil samples for pesticide residues. Keep in mind there is considerable cost for this type of analysis. It is best to identify or narrow the chemicals suspected to be present in the soil to reduce the cost of testing.

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