Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans"

Arsenic Contamination in Gardens

Answers to Frequently Asked Health Questions

What is arsenic?

Arsenic (As) is a common element found in the Earth's rocks and soils. Arsenic has no smell or taste.

Where is the arsenic found in nature?

Arsenic is found in certain types of rocks and soils. Different parts of Ohio have different rock formations. Ohio's soils typically contain concentrations of arsenic between 0.5 and 56.0 parts per million (0.5 - 56.0 ppm), with an average value of 5.72 ppm. Certain types of arsenic can dissolve in water. Ohio's groundwater contains naturally-occurring arsenic levels between 5 and 50 parts per billion (5-50 ppb).

Types of arsenic (both types occur naturally):

- Organic arsenic: This type can be found in many foods, especially seafood, and is less likely to cause health problems than inorganic arsenic.
- Inorganic arsenic: This type can be found in the drinking water and can cause health problems at high levels of exposure. * Very high levels of inorganic arsenic in food or water can cause serious, sudden health problems or even death.

How do higher levels of arsenic get in the environment and your body?

Soils: Most arsenic in Ohio soils is naturally-occurring.

- Children can come into dermal (skin) contact with arsenic when playing outside in contaminated soils. Young children will often engage in hand-to-mouth actions where they can ingest the arsenic.
- People who have gardens or flower beds can also come in contact with arsenic contaminated soils through dust inhalation or ingestion.
- People who eat (ingest) food that was grown in arsenic contaminated soils can also come into contact with arsenic.
- Although people can breathe arsenic in dust, there are not significant airborne sources of arsenic in Ohio (i.e. arsenic smelters).

Water: Arsenic can dissolve into the groundwater (underground drinking water) and can contaminate and impact drinking water sources.

- Humans then drink (ingest) the contaminated water.

Air: Arsenic can be released into the air when arsenic-containing materials are burned.

- People can then breathe the arsenic contaminated smoke and vapors (inhalation).

Who is more likely to come in contact with higher levels of arsenic?

We all have a small amount of arsenic in our bodies but people can come into higher levels from the following sources:

- Private well users that live in areas with higher levels of natural arsenic in their well water.
- Kids who play outside in dirt with high levels of arsenic.
- People who have gardens or flower beds in soils with higher arsenic levels.
- People who drink water contaminated by a nearby chemical plant or hazardous waste site.

Can you get sick from arsenic?

Yes, you can get sick from arsenic. But getting sick will depend on the type of arsenic and the contact (exposure) you had with this chemical.

Getting sick from exposure (contact) with arsenic depends upon the following:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General Health, Age, Lifestyle
  Young children, the elderly and people with chronic (on-going) health problems are more at risk to chemical exposures.

Routes of exposure:

- Eating and drinking (ingestion) – Main route.
- Breathing (inhalation) – Lesser route of exposure.
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- Skin contact (dermal contact) – Not readily absorbed through skin, unlikely route of exposure.

Where can I get more information?

For more information about arsenic, how we measure arsenic, how arsenic affects our health, and if there a medical testing, visit the ODH Health Assessment Section Web page, select the chemical fact sheets and then select the Arsenic fact sheet.

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How can families reduce the risk of exposure to arsenic?

One important way a family can lower their exposure to arsenic is to avoid exposure to arsenic-contaminated soil and dust sources. The swallowing of arsenic-contaminated soil or dust is a very important exposure pathway for children and gardeners.

Helpful hints:

- Washing your hands to remove arsenic dust and soil, especially before meals, can lower the possibility that arsenic on the skin is accidentally swallowed while eating.
- Families can lower exposures to arsenic by regularly cleaning the home of dust and tracked-in soil.
- Door mats can help lower the amount of soil that is tracked into the home and removing your shoes before you enter the house will also help.
- Covering bare soil with clean sand, wood chips, gravel or grass can lower contact that children and pets may have with soil and the tracking of soil into the home.
- Bag gardening-work clothes before they are brought into the home for cleaning.
- Use gardening gloves to reduce your exposure to arsenic dust and soils
- Avoid working in the yard on windy days and/or consider wearing a mask if you spend time in dusty areas.
- Dampen soils with water before you garden to limit the amount of dust you inhale.
- Immediately wash your hands or shower after working with arsenic-contaminated soils.

References:

ATSDR Toxicological Profile Arsenic. 1999.

ATSDR Spring Valley. Safe Gardening, Safe Play, and a Safe Home. 2004.

US EPA *Safe Gardening, Safe Play and a Safe Home*, February 2010

Washington State University Cooperative Extension. Gardening on Lead and Arsenic-Contaminated Soils. 1999.

Cox-Colvin & Associates. Evaluation of Background Metal Contaminants in Ohio Soils. 1996.

Coming Alongside. Community Gardening Arsenic-Contaminated Soils. 2012.

Good Gardening Practices:

Eating fruits and vegetables and getting plenty of exercise are essential parts of a healthy lifestyle. Washing the soil from your homegrown fruits and vegetables is one of the most effective ways of reducing your exposure to not only arsenic but to pesticides and germs. Scrub firm fruits and root crops with a vegetable-cleaning brush to remove dust and dirt before peeling or eating.

- Grow crops in raised beds or containers with arsenic-free soil and/or mix the soil with organic material; organic materials such as peat moss, compost and manure bind to arsenic and reduces how much plants take up.
- Plants can absorb more arsenic if you have acidic soil. Keeping your soil at a near-neutral range (pH 6-7) can help reduce the amount of arsenic absorbed.
- Iron can also help prevent arsenic from being absorbed. The iron combines with arsenic to form iron arsenate, a form of arsenic that is not well absorbed by plants.
- Avoid or limit the use of fertilizer products that contain phosphorous, as it can increase plant uptake of arsenic.
- **Note:** Some lawn and garden products and fertilizers contain arsenic, so it is a good idea to check with your lawn and garden store for products that do not contain arsenic.

Vegetables with a greater uptake of arsenic:

- Root crops: Root crops such as beets, turnips, carrots, radishes and potatoes absorb most of the arsenic in the surface skin of the vegetable. If you grow root crop vegetables, **thoroughly** wash and scrub them with a vegetable-cleaning brush to remove dust and dirt before peeling. Avoid eating the peel and **do not** compost them in your rot pot!
- Leafy vegetables: Leafy vegetables such as lettuce, spinach, collards, kale, and mustard and turnip greens store more arsenic in the leaves than do other crops, but not at concentrations high enough to cause concern. If you grow leafy vegetables, **thoroughly** wash them to remove the dirt before eating.

Safer fruits and vegetables:

- Plant fruiting crops such as tomatoes, peppers, squash, cucumbers, peas, beans, corn, melons, strawberries, etc. uptake very little arsenic. Scrub fruiting crops **thoroughly** to remove dust and dirt before peeling or eating.

Fresh fruits and vegetables not only taste good, they are good for you. You don't have to stop gardening!

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