

Trichloroethylene (TCE) and Gardening

Trichloroethylene (TCE) is a commonly used chemical that can be in air, soil, or water. This sheet has information about TCE and the possible health concerns when water with TCE is used to water garden plants.

If I water my garden vegetables with my well water that contains TCE, are the vegetables safe to eat?

Yes, garden vegetables watered with well water that contains TCE are expected to be safe to eat. TCE is highly volatile which means it moves from water to air easily. When you water the garden, especially through spray irrigation, the amount of TCE in the water will be significantly lowered as it moves into the air. Therefore, very little TCE is expected to be available to the garden plants. Any TCE that is remaining in the water can be taken up by plants; however, the plants will move the TCE through their leaves into the air. Trees can collect TCE in their trunks because tree bark is a barrier to volatilization.



If any TCE actually enters fruit or vegetables, the movement of TCE into the air, or volatilization, prevents it from collecting in the plant. In two separate studies, no TCE was detected in garden vegetables (carrots, tomatoes, spinach) after watering plants with contaminated water with different amounts of TCE (140 parts per billion (ppb) and 560 ppb in one study and unspecified concentrations from a groundwater plume containing TCE in another study) (Doucette et al., 2007; Schanbel et al. 1997).

Can TCE be broken down by plants?

TCE can also be broken down by plants during the process of making food into energy. The altered chemical products that result from this process are metabolites like trichloroethanol, trichloroacetic acid, and dichloroacetic acid. These chemical products have not often been detected in plants (Doucette et al., 2007; Schanbel et al. 1997; Schroll et al. 1994). They may exist as residues bound to plant tissue and are expected to have lower toxicological health effects than TCE (Doucette, personal communication; Schnabel, et al. 1997). The toxicity of the metabolites and bound residues should be studied further to confirm their safety.

Are root vegetables more likely to have TCE or metabolites in them than above ground produce?

You might be able to find TCE in root vegetables if the contact with TCE is high and constant. This is extremely unlikely from superficial garden watering (Doucette, personal communication).

References

- Doucette, William (2012) personal communication February 22, 2012
- Doucette, WJ, Chard JK, Fabrizius H, Crouch C, Peterson MR, Carlsen TE, Chard BK, Gorder K (2007) Trichloroethylene Uptake into Fruits and Vegetables: Three-Year Field Monitoring Study. Environmental Science and Technology Volume 41 p 2505-2509.
- Schnabel WE, Dietz AC, Burken JG, Schnoor JL, Alvarez PJ (1997) Uptake and Transformation of Trichloroethylene by Edible Garden Plants.
- Scchroll R, Bierling B, Cao G, Dorfler U, Lahaniati M, Langenbach T, Scheunert I, Winkler R. Uptake Pathways of Organic Chemicals from Soil by Agricultural Plants. Chemosphere Volume 28 p 297-303.

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