Science Societies

Toxic Metals and Salty Soil Threaten Food Safety, Study Finds

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November 1, 2024

Scientists are exploring how excessive salt and heavy metals brought into the soil by irrigating with wastewater can damage crops and also how to remove and how to remove the heavy metals that enter soils. Photo courtesy of Adobe Stock/ChiccoDodiFC.

This article is part of a new series breaking down and explaining recent food and farming research for readers of all backgrounds, including those without formal scientific training.

When pollution forces farmers to use sewage or industrial wastewater for irrigation, crops suffer and can even pass toxins to people. This heavy metal toxicity contaminates the soil and may be absorbed by crops, damaging their organs and overall health.

Rising temperatures caused by climate change worsen these problems, and for more than 100 countries worldwide, heavy metals and salt are major threats to the food supply.

Scientists are exploring how poor irrigation can damage plants and how to remove the heavy metals that enter soils. In a study published earlier this year in *Agrosystems, Geoscientists & Environment* (https://doi.org/10.1002/agg2.20487), researchers studied arugula, cress, and parsley in soils treated with heavy metals to see if any of them could avoid absorbing it through their roots. Unfortunately, they were found to accumulate heavy metals incredibly well.

According to the study, the lead content in soil needs to be measured before planting these crops to ensure that they are safe to eat. Research like this could be especially useful to developing nations where, according to the Food and Agriculture

Organization, 50% of farmland has excessive salt and heavy metals due to wastewater use on crops like lettuce and parsley.

Some heavy metals—like copper, nickel and zinc—are essential for plants, but metals like lead, chromium, and cadmium poison the environment. The combination of these elements only worsens the toxicity.

Researchers measured the shoots, roots, and leaves of plants in an untainted field against a field watered with heavy metals. Every plant reacted differently, but nutrient loss was common across all plants. Lead and cadmium poisoning stunted the growth of roots, and too much sodium in the soil can prevent the intake of elements the plants actually need, like potassium and carbon.

The research revealed many new findings, including that:

- Excessive heavy metals caused crops to lose height, leaf size, and weight.
- Cress absorbed heavy metals the best, followed by parsley and arugula.
- Heavy metals caused plants to consume most of their own chlorophyll and turn brown and wilted.
- Salt exposure lowered metabolism and heavy metals deplete nutrients in the crops.
- Plants that accumulated large amounts of heavy metals were more resistant to salt, proving that plants adapt differently to salt stress, and some will be better suited to survive climate change than others.
- None of the plant nutrients reacted the same to soil salt.

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