

## After The Fire: Home Garden and Fruit Tree Safety

Chemicals and particulate matter in wildfire smoke are associated with short- and long-term health effects. This is mainly caused by long-term exposure to particulate matter, or “PM”.<sup>1</sup> When wildfires burn homes and buildings, harmful compounds and heavy metals are released during the combustion of materials such as plastics, petroleum, asbestos, and batteries.<sup>2</sup> These contaminants in wildfire ash can coat garden produce and enter soils and water sources, potentially harming people through food and drinking water contamination.<sup>3</sup>

**After wildfires, there are simple precautions you can take to reduce your exposure to potential contaminants in your garden.**

### How Food Becomes Contaminated

During wildfires, plants accumulate chemicals and metals in numerous ways, including through deposits of ash on leaf surfaces (Figures 1, 2) or soil-root uptake.<sup>4,5</sup> Plant characteristics also affect the ways these potential contaminants become stored on and within the plant. For example, root vegetables directly contact soil contaminants, while large leaves collect airborne PM (like smoke and ash) and soil splash. Woody plants, such as fruit trees or cane berries, are less likely to pass soil contaminants touching roots into edible plant parts, but all plants can absorb airborne surface deposits through leaves. Smooth fruits, like tomatoes, squash, apples, pears, and berries, likely uptake the least compounds from airborne PM.<sup>2,5</sup> A smoke impact study during an urban wildfire surprisingly found minimal leafy vegetable contamination and therefore a low expected increase of health risk.<sup>4</sup> Rinsing vegetables works to reduce overall contaminants, and can effectively remove certain contaminants (e.g. lead and cadmium) from leaf surfaces, although adequately removing trace contaminants depends on the crop species, soil type, and PM size.<sup>6</sup> Remembering to be mindful while gardening and harvesting helps to limit your exposure to potential contaminant hazards.



**Figure 1.** Inspect produce for heavy layers of ash or dust. Discard produce with burns, soot, or fire suppression chemical residue.

### Minimizing Risks While Gardening During and After Wildfires

Humans are most exposed to wildfire contaminants directly from their environments, particularly from inhaling smoke, contacting contaminants with bare skin, and ingesting contaminants from hand to mouth. Eating produce from smoky gardens carries minimal risk.<sup>2,4</sup> Those at greatest risk of health impacts are older adults, children, individuals who are pregnant, have cardiac or respiratory conditions, work outdoors, or are lower economic status, which relates to residential condition and access to nutrition and healthcare.<sup>1,7</sup> **Limiting time outside and contact with contaminants reduces one’s overall risk, especially for people with additional health concerns.**



**Figure 2.** A scorched fruit tree indicates exposure to heat and potentially harmful particulate matter. Photo: Yana Valachovic.

Learn your site history to uncover underlying sources of contaminants and potential exposures. The distance from burned areas, fuel types burned, fire intensity, duration, and wind direction all affect the composition and amount of deposited PM. Heavy layers of soot or ash on plants, signs of extreme heat (Figure 2), nearby burned structures, or any fire suppression chemicals (red or foamy-wet residues) are dangerous, and affected produce must be discarded, not composted.<sup>8</sup>

After possible contamination, lab-based soil testing will help you assess your soil quality and safety for future gardening. Use the tips below to restore the health of your garden in less dangerous sites. For gardens in dangerous condition, seek help from your local Extension horticulture advisor or Master Gardeners for the best soil and garden practices. Ultimately, risk must be decided case-by-case based on your site history, frequency of exposure, and individual health status.

### Limit Your Exposure in the Garden

Limit your exposure and potential injury by taking precautions and protecting yourself. The best way to limit exposure to wildfire smoke and ash is by restricting outdoor activity. When gardening or harvesting in smoky air, protect yourself by wearing N95/KN95 (or better) masks with ventilators, gloves, long sleeves and pants, and close-toed shoes or boots.<sup>9</sup> Goggles may help sensitive eyes. Avoid leaf blowers or vacuums to remove ash from produce or gardens, as these lift contaminated dust into the air. Reduce tracking contaminants indoors by removing shoes and outer clothing layers before going inside. Clothes should be bagged or washed immediately to not contaminate indoor air. Hand washing before and after working in the garden or with produce helps keep you and others safe from exposure.

There are simple actions you can take to reduce the risk of contaminants in your garden. **Practice low-impact irrigation methods**, like drip irrigation and soft sprayers, to prevent soil particles splashing onto vegetables (Figure 3). Mulches and soil covers also reduce soil splash and dust, and additionally save on water use. **Amend marginally contaminated soils with composts or other appropriate amendments**, which introduces microbial and fungal activity to support the breakdown of chemicals and the immobilization and reduced short-term plant uptake of heavy metals.<sup>10,11</sup> Amendments can reduce metal bioavailability, but the total heavy metal concentrations in the soil remain unchanged, thus removal of contaminated soils is likely needed. **Consider replacing contaminated soils with clean soils and installing raised bed gardens.**<sup>12</sup>

Consider that small amounts of contaminants can affect health over time, thus your cumulative exposure to environmental contaminants including, but not limited to, wildfire events should guide your personal risk assessment. For more information see the “After the Fire: Soil Management” factsheet.

### Rinse Your Produce

- **Discard produce that is burnt or coated in soot, ash, or fire suppression chemicals.**
- **Discard the outer leaves of leafy greens** which have the most ash and soil particles attached.



**Figure 3.** Use drip irrigation and mulch to prevent ash and soil from splashing onto produce.



**Figure 4.** Pre-wash vegetables affected by wildfire smoke after harvesting outdoors.

- **Pre-rinse produce outside** with a gentle spray or dip in potable water to remove soil, grit, ash, and other particulate matter (Figure 4).
- **Rinse produce inside in cool, running water.** Use a produce brush on hard, bumpy surfaces, and hands and fingers on smooth or delicate surfaces. Peel fruits and vegetables to remove outer layers.

While urban wildfires can expose people to hazards through contact with contaminated air, water, food, and soils, **wildfires rarely permanently damage gardens, orchards, and agricultural systems.** Because increasing concentrations of potentially harmful particulate matter in soils may not be immediately obvious, lab testing is recommended. Gardening has many benefits, including stress relief, and eating nutritious foods can serve as a protective factor from wildfire smoke and ash.<sup>13</sup> **Considering your personal health factors and your garden's proximity to burned areas will help you decide whether to use your garden produce.**

## References

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Updated 2/21/2025

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