



Hold Your Ground: Mitigating the Effects of Post Fire Hydrophobic Soils

Prepared by the UC Master Gardeners of Butte County

Soils damaged by the intense heat of fire become water repellent. Their post-fire inability to absorb and filter rainfall can cause immense problems with erosion and runoff. Hydrophobia occurs when plant materials burn hot and release a waxy substance that penetrates the soil while still in gas form. When this gas cools and becomes solid, it coats soil particles.

Hydrophobia in burn-scarred soils makes them as water repellent as pavement, and the National Weather Service notes that it takes much less rainfall to cause a flash flood in post-fire landscapes. Their rule of thumb is “if you can look uphill from where you are and see a burned area, you are at risk.” Flash flooding, mud flows, and debris flows are major threats of hydrophobic soils.

The type of soil and the intensity of the fire determine how deeply hydrophobia penetrates the soil, and how long the condition persists. Paradoxically, the fastest draining soils (light, sandy soils with large pores) are the most prone to post-fire hydrophobicity because they transmit the heat more easily than heavy, dense, clay soils. Regardless of the physiology of hydrophobicity, what matters most is how to mitigate its effects.

The following steps can be taken to lessen and control the damage caused by heavy rain and burn scarred soils. To hold your ground:

- Clear drainage systems, such as culverts, diversion ditches, or narrow swales, of debris. Clogged drains are a primary cause of erosion, even without fire damage.
- Divert water from areas originally designed to sheet runoff to the landscape: instead, redirect the runoff towards your newly cleared drainage systems or, if they exist, towards storm drain systems such as gutters. Use sandbags, diversion ditches, staked board, dry stacked walls, or bales to redirect water flow.
- Minimize foot and equipment traffic on burned landscapes. Such traffic can further compact already damaged soils on flat areas, and can weaken soil bonds and dislodge soil particles on slopes. Develop plans to restore your injured landscape before tramping around on it, and keep all traffic to the smallest degree possible during restoration activities.
- Leave whatever non-toxic debris you can in place. Burnt plant remnants and other garden features can protect the landscape from wind and water erosion, and help protect any seeds and plants that survived the fire.

Additional information about fire recovery and fire-safe practices can be found at our web site in the Fire-Safe Landscape section:

ucanr.edu/p/49962

Sources

Laura Lukes, “Hold Your Ground, Mitigating the Effects of Fire on Your Soil” (*Chico Enterprise-Record*, December 14, 2018 and in the *Real Dirt* Blog section of our website: tinyurl.com/ydylu73m).

Douglas Kent, “First Aid for Sonoma County’s Fire-Damaged Soil,” *Santa Rosa Press Democrat*, October 27, 2017