

# The New Normal – Rebuilding Soil After Fire

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# Soil Problems Following the Fire

House and landscape destroyed → scraped soil



Fountaingrove  
Santa Rosa



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# Soil Problems following the Fire

House intact, landscape destroyed



Hidden Hills  
Santa Rosa



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# Soil Problems following the Fire

House and landscape next door destroyed



Coffey Park



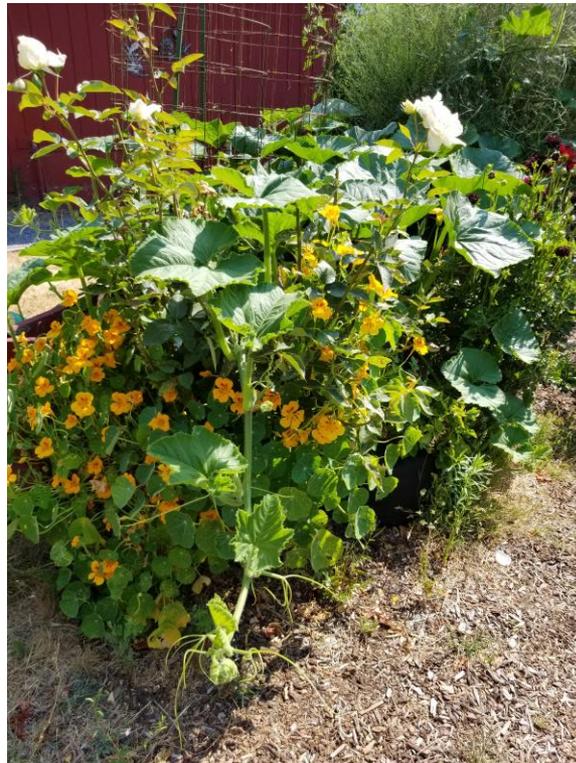
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# Soil Problems following the Fire

Some ash on landscape from distant wildfires



Penngrove



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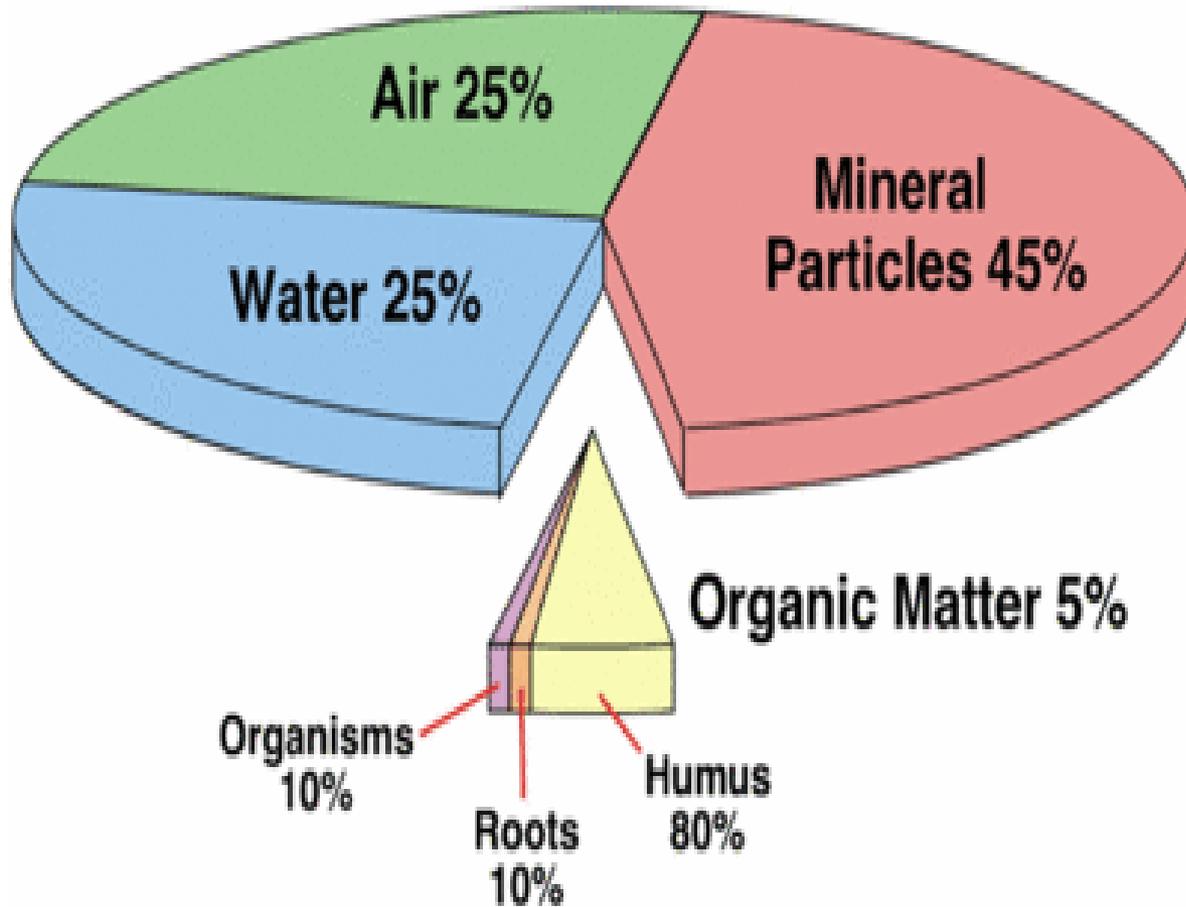
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# Fire Effects on Soil

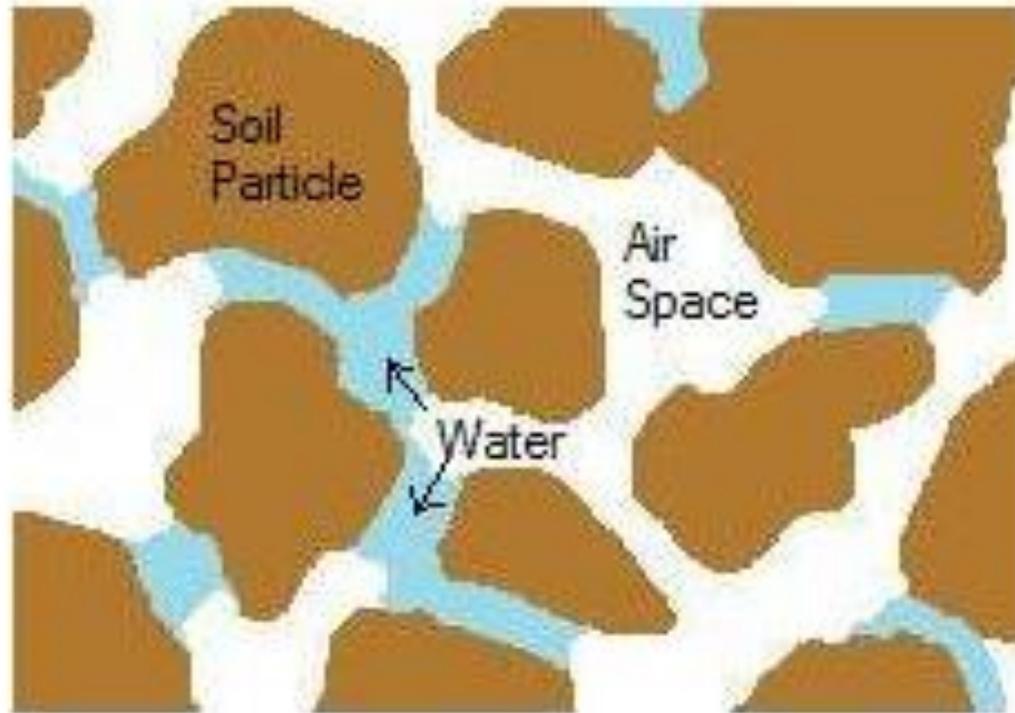
- Components of soil
- How do wildland fires affect soil?
  - Soil heating
  - Effects on microorganisms and organic matter
  - Effects on soil nutrients
  - Regeneration
- Gardening best practices in potentially contaminated areas



# Components of Soil



# Components of Soil



<https://www.soilmoisturesense.com>



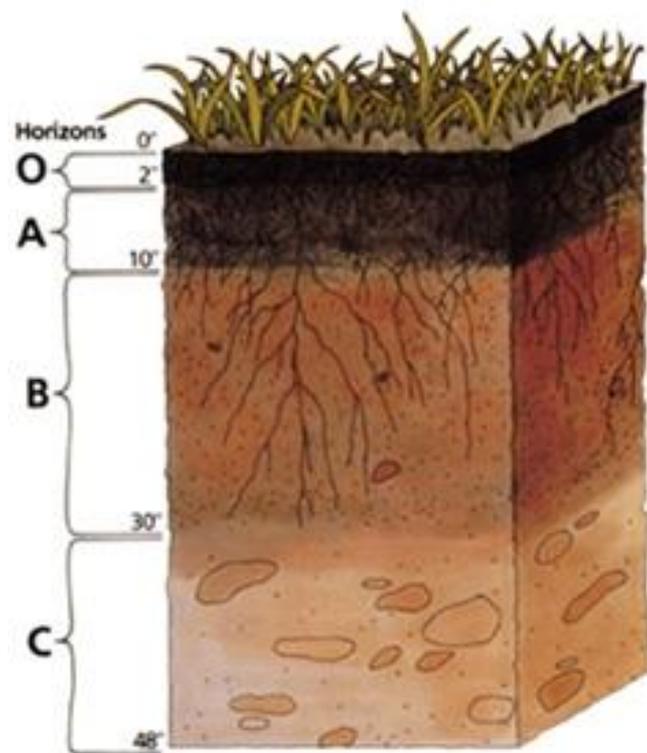
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# Soil Layers (Horizons)

Most organic matter is found in the top soil layers



ucanr.edu



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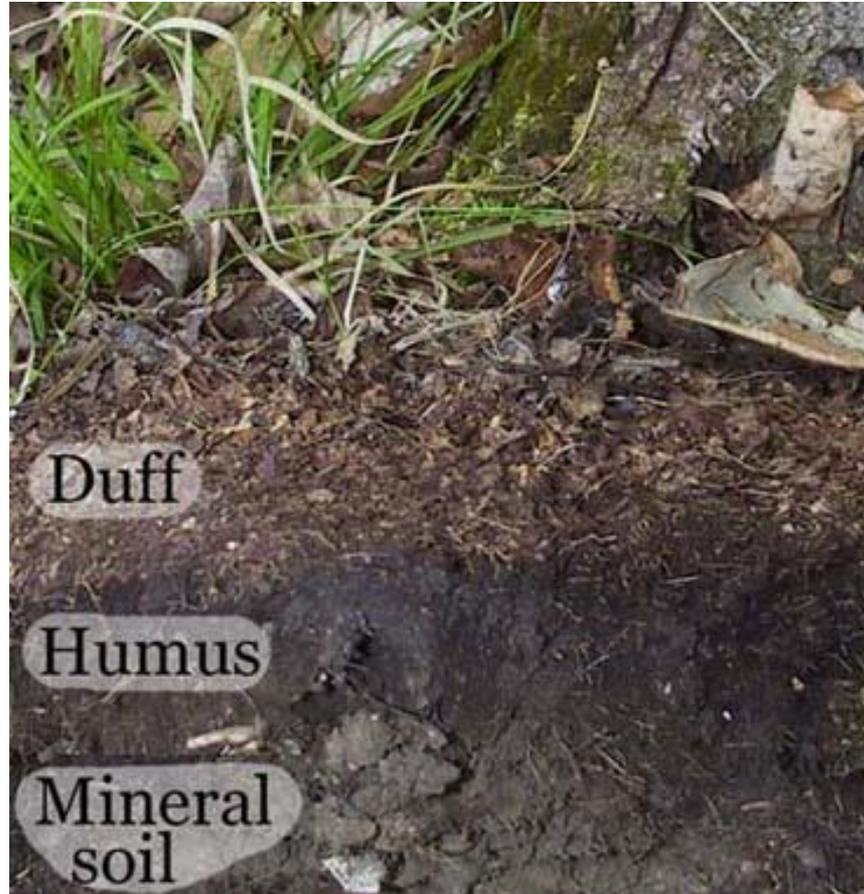
# Litter → Duff → Humus

- Litter = freshly fallen leaves, needles, twigs, stems, bark, and fruits
- Duff = decomposing litter
- Humus = well decomposed organic matter in soils from litter and duff

*Modified from Soil Science Society of America*



# Litter → Duff → Humus



<http://www.magma.ca>



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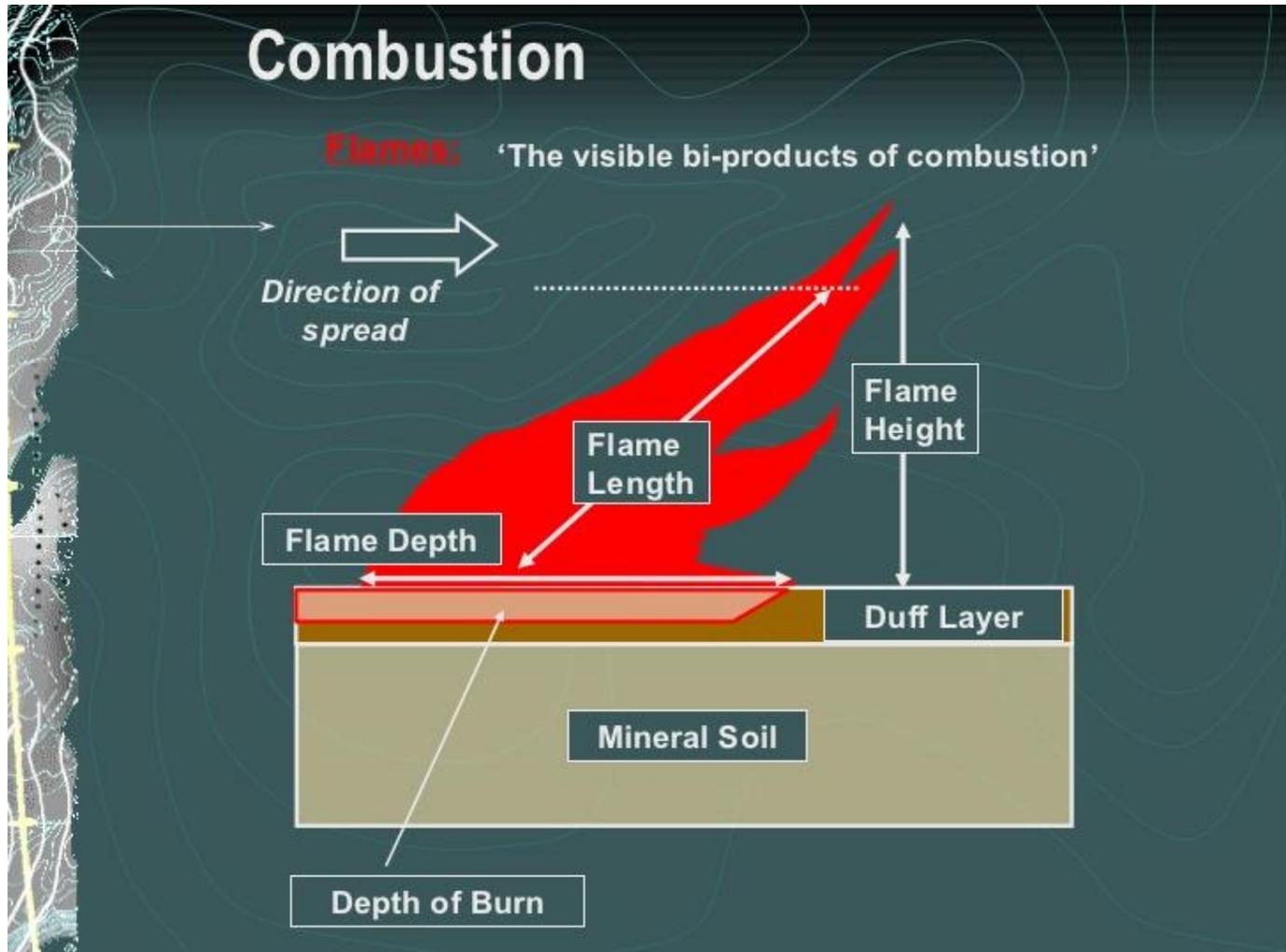
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# How do wildland fires affect soil?

- Surface litter and duff burn
  - heat top soil layers
- Soil does not conduct heat very well



# How do wildland fires affect soil?



<https://www.slideshare.net/TomPurdy>



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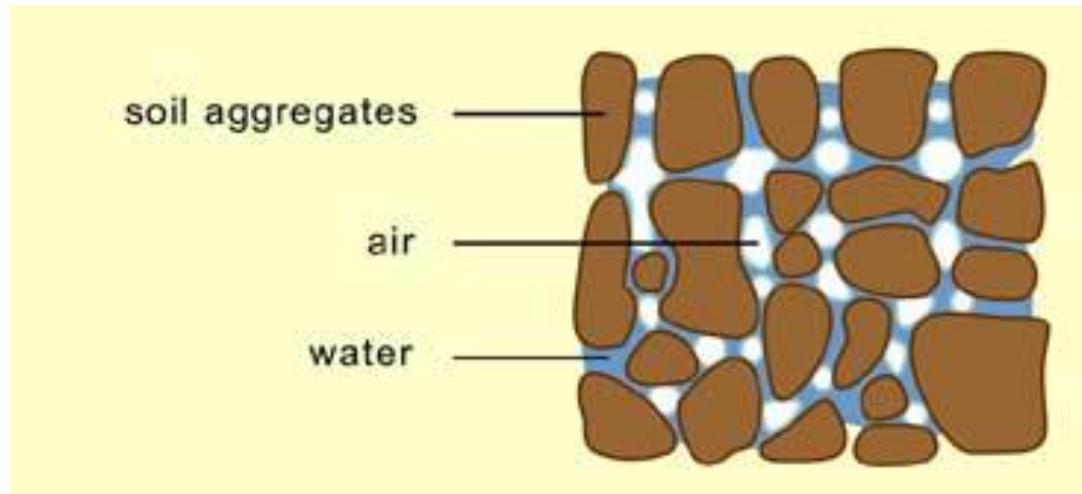
# How do wildland fires affect soil?

- Heat top layers of soil
  - kills living organisms
  - burns organic matter
  - ash → alkaline
  
- temporary changes in presence and availability of nutrients



# Soil Heating

- Loss of soil structure
- Changes water movement through soil
- Leaching of plant nutrients



<http://lrrpublic.cli.det.nsw.edu.au>



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# Soil Heating

Soil regenerates over time

→ Gradual addition of organic matter

→ Migration of microorganisms



Sonoma  
Valley  
Regional  
Park



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# Plant Regeneration

Toyon (*Heteromeles arbutifolia*)  
Cavedale Road, Sonoma Valley



California Bay Laurel (*Umbellularia californica*)  
Hidden Hills, Santa Rosa



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# Plant Regeneration



*Muhlenbergia rigens*



*Arbutus menziesii*



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# Effects of House Fire on Soil

- Plenty of fuel
- May produce toxic substances
  - house (building materials)
  - furniture (synthetics)
  - consumer electronics (metals)

Coffey Park



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# Soil Problems following the Fire

House and landscape destroyed → scraped soil

- Aerate scraped soil with broad fork
- Add soil
- Compost on top of soil



# Soil Problems following the Fire

House intact, landscape destroyed

Native plants – let the soil be



Hidden Hills  
Santa Rosa



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# Soil Problems following the Fire

House intact, landscape destroyed

Non-native plants –

- Add 2”-3” compost
- Replenish compost as it disappears



# Best Practices Potentially Contaminated Soil

## Test your soil



<https://forages.osu.edu>



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# Best Practices

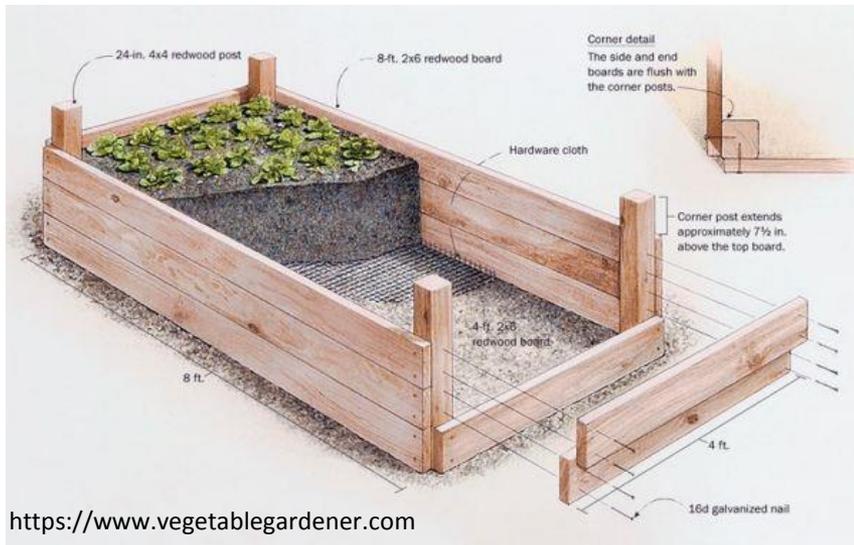
## Potentially Contaminated Soil

- Mulch to keep down contaminated soil dust
- Raised beds



# Raised Beds

- Sand and activated charcoal (20 lb/100 ft<sup>2</sup>)
- Import clean soil
- Amend with organic matter (compost, mulch)



# Summary

- Fire changes soil
- Living organisms and organic matter are temporarily affected
- Soil regenerates
- Toxics? Mulch landscape and use raised beds with sand and activated charcoal

