



## Sustainable slash piles: Burning wood waste to make biochar

By Derek Lowstuter (Sept. '24)

Natural wood waste, commonly called slash, is created when trees and shrubs are trimmed or cut down. This is from activities such as forest thinning, defensible space clearing, landscape trimming, or hazard tree removal. This material is often bulky and awkward to handle making disposal difficult.

Burning small trees, branches, and brush can be a viable approach to eliminating wood waste.

Using the conservation pile technique for burning wood waste can offer a more sustainable approach than traditional slash piles while also creating biochar, a valuable soil amendment.

### Why burn wood waste?

Burning wood waste in slash piles is most appropriate when there is a large amount of material to be disposed of, there is sufficient space to safely burn it, and alternatives are not affordable or close by.

Although it takes time to gather and prepare wood piles to safely burn them, this is often easier than transporting wood to a disposal site and more affordable than hiring someone to remove it.

### Alternatives to burning waste

Wood disposal methods depend on the budget for removal and the amount, size, and location of the wood waste. Wood waste can be disposed of by:

- Participating in community clean-up and chipping programs
- Hiring private waste disposal companies
- Renting or purchasing woodchippers

### Building a better slash pile: The benefits of conservation piles

Conservation piles differ from typical open slash piles because they are built and managed to support a strong and consistent flame that burns from the top of the pile downward.

Conservation piles take a little extra thought to build and burn but can offer significant benefits for your property and surrounding environment.

- Lower risk of soil and root damage due to overheating
- Lower greenhouse gas emissions
- Less smoke (fine particulate pollution)
- Creates biochar, which can be used to improve soil health and sequester carbon long-term

### How to safely build and burn a conservation pile

Burning wood waste from your yard or forest property is like painting a room. How? Things go so much more smoothly (and can even be enjoyable!) with adequate planning and preparation.

#### Pile location

Piles should be built where there are not objects or structures (e.g., buildings, power lines, etc.) close by or overhead that could be damaged by heat or allow flames to spread upwards.

Flammable material should also be raked at least three feet away from piles to prevent fire from spreading on the ground.



### Getting an open burn permit

**The first step to burning wood waste is submitting a permit application.**

Open burn permits are free to submit and easily obtainable from the Colorado Department of Public Health and Environment or your local county government. Not having a permit could result in fines as high as \$10,000 per day.

The permit process helps local officials and emergency managers avoid unnecessarily dispatching fire services in response to your burn and gives them the opportunity to share important and timely information, such as wind speed restrictions to be aware of to reduce the risk of fires spreading out of control.

Permits allow for burning 50 or fewer slash piles in a calendar year and pile size is limited to 8'x8'x8' and burned piles must be cold by sunset. Please contact your local fire and public health offices before burning wood waste as there may be additional restrictions and requirements.

The Colorado Department of Public Safety maintains an updated list of known fire restrictions.

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A conservation pile “teepee” with small wood pieces in the center and larger pieces leaning against it. The pile is then lit on top. Photo credit: Kelpie Wilson

### Pile Structure

Start by making a loose stack of wood pieces. This can be done directly on the bare ground – a barrier between the pile and the soil is not necessary.

The largest pieces should be placed in the lower third of the pile or leaned against the pile once the primary structure has been created. The smallest material should be placed on the top of the pile.

Material in each pile should be about the same size. If there is too much of a size difference, smaller pieces will burn to ash before larger pieces have charred.

It is best to use material less than 8 inches in diameter for conservation piles. This allows even heat flow and reduces burn time.

Avoid compacting the pile to maintain adequate airflow.

Piles can be square, round, or triangle shaped. The correct stacking of wood in the pile is more important than its shape.

### Igniting the pile

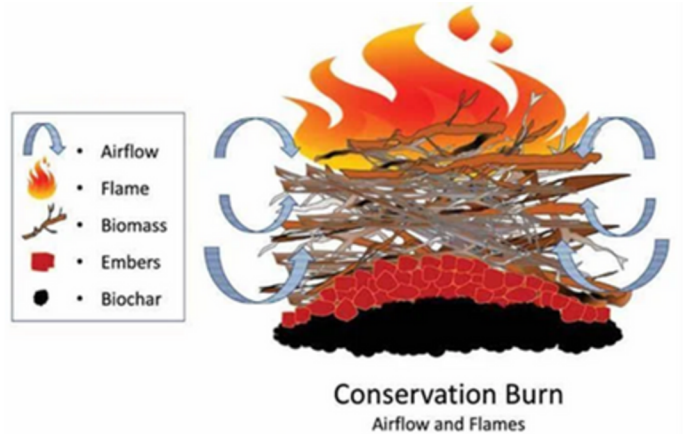
Light the pile from the top, not the bottom. This creates a “flame cap” effect, burning the wood directly below the flame, while more cleanly reburning the smoke as it is produced.

Some smoke is still expected when the fire is just getting started, if the wood is damp, or if the pile is packed too tightly.

A small amount of accelerant, such as diesel fuel, can be used to help start the fire if needed.

The fire will burn its way down through the pile and the flames will go out naturally after several hours. The glowing, hot coals should be raked out across the soil and/or quenched with water before they turn to ash to ensure the fire is out and to conserve as much charcoal as possible.

The resulting charcoal is high in carbon that otherwise would have been released into the atmosphere. This charcoal, also referred to as biochar, can be used as a soil amendment, either where the wood waste came from or in other plantings.



Conservation pile diagram showing biomass (wood waste) being turned into embers and biochar (charcoal) from the flame above. Image credit: Kelpie Wilson

### Additional tips for conservation pile construction

- Have small wood pieces on hand to add to the top of the pile in case the flames die out before the pile is fully charred. This keeps the flame cap burning and allows more material to be disposed of.
- If possible, piles should be kept dry. Dry piles burn faster and produce less smoke.
- Piles should also be free of dirt, plastics, and treated wood.

### Necessary safety equipment for burning a slash pile

- Phone with reliable service to notify your local fire department when piles are lit and extinguished
- Charged water hose coming from a structure, hydrant, or vehicle-mounted tank
- Metal rake(s) such as a hard-tine garden rake or fire rake, called a McLeod
- Personal Protection Equipment (PPE): Cotton and/or fire-resistant clothing; gloves; boots; eye protection or full-face shield for heat, smoke, and scratch defense
- First aid kit to treat minor cuts and burns
- Drinking water

## Using biochar from a conservation pile

Thoroughly wet the charcoal (biochar) before adding it to a garden, agricultural field, or compost pile. This will reduce dust, help neutralize pH by washing off ash, and speed up colonization by beneficial microbes.

When biochar is properly applied to compost it can have a range of benefits leading to better plant growth.

### Resources

1. Allohverdi T, Mohanty AK, Roy P, Misra M. (2021). A Review on Current Status of Biochar Uses in Agriculture. *Molecules*, 26(18), 5584
2. Stewart, C.E., Zheng, J., Botte, J., Cotrufo, M.F. (2013). Co-generated fast pyrolysis biochar mitigates greenhouse gas emissions and increases carbon sequestration in temperate soils. *Glob. Change Bio. Bioenergy*, 5, 153-164.
3. Wilson, Kelpie. (2024). *The Biochar Handbook*. Chelsea Green Publishing. White River Junction, VT.