



UI Extension Forestry Information Series II

Fire No. 15

Mulches for Firewise Landscapes

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Fire in the forest! It's a fact – Idahoans live in fire-based ecosystems. Wildland fire is not a question of if it will happen, but when. Residents of the wildland/urban interface – where the urban environment meets the wild – have the responsibility of protecting their families and property from fire. And one of the best ways to do this is to establish and maintain a firewise landscape.

There is a large amount of information available to landowners about firewise landscaping (sources are listed for your information at the end of this article), but one aspect of a firewise landscape frequently gets mentioned but not fully addressed and that is mulch. Mulch you say? Yes, mulch.

Mulch is defined as any material used to cover the soil, come in a variety of shapes and forms, and can be organic or inorganic. Organic mulches come from plant materials and include pine needles (or pine

straw), wheat straw, bark nuggets, shredded bark, sawdust, wood chips, cocoa shells, and sod.

Organic mulches can:

- reduced evapotranspiration from soil surfaces, cutting water use by 25-50%.
- promote soil microorganism activity, which improves soil tilth.
- lessen soil compaction.
- control weeds.
- moderate soil temperature extremes.
- control erosion.
- improve aesthetics.

The downside is that all organic mulches are ignitable and flammable, a major consideration in fire-probe landscapes.

Inorganic mulches are derived from non-plant materials and include rock, gravel, and brick chips. References classify ground and shredded recycled rubber products as organic or inorganic – a classification that has nothing to do with the flammability of the product. Inorganic mulches have many of the same benefits of organic mulches except that they do not contribute to soil nutrition. Another problem with inorganic mulches is that they can raise soil temperatures and create heat islands, greatly stressing the plant materials they surround.

All mulches will vary in size, shape, texture, and composition, all of which affects combustion and flammability. A combustible material is one capable of igniting and burning. Several studies have been done on the combustibility of mulch materials. All of these studies selected between eight to 13 different mulch products and exposed them to weathering for a pre-determined length of time (from two weeks to



Plant materials should be carefully selected and surrounded by well-watered lawn and low-flammability mulches.

two months). Each study selected sources of ignition to simulate natural conditions.

- Cigarettes were used to simulate a carelessly tossed cigarette.
- Charcoal briquettes were used to simulate fire-brands and embers being blown into mulch from adjacent wind-driven crown fires.
- Propane or drip-torches were used to simulate the flaming front of ground fires moving into mulched areas.

Fans were also used in one study to simulate windy conditions. All of the studies looked at the ignition and flammability of each mulch product. Ignition refers to the speed at which the mulch lit and flammability refers to the height the flames reached after igniting.

Results.

All of the tested mulches varied considerably in terms of ease of ignition, flame height, rate at which flames spread, and temperatures above the mulched bed. The length of time a mulched bed was exposed to an ignition source, as well as the actual temperature of the bed at the time of the test greatly affected ignition, as did the amount of time the mulch materials were exposed to weathering. Using information gathered from each study, Table 1 rates each type of mulch as low, medium, or high in ignition and flammability characteristics.

Smoldering mulch.

Debris accumulated on top of inorganic mulches was

found to be highly ignitable, but not able to carry a flame for any length of time. A very real problem with organic mulches is smoldering. Flaming brands and embers can travel for up to 5 miles ahead of the flaming front of a wildfire and often result in a phenomenon known as "red snow".

Smoldering occurs when these flaming brands/embers land in combustible materials that do not have a high ignition point. The burning bits land and get caught in between the pieces of mulch, where they do not burst into flames but smolder. Smoldering mulch can escape detection by firefighters and flare into flames as time passes. Additionally, the longer smoldering mulch is in contact with the bark of a tree or shrub the greater the cambial heating and damage.

Recommendations.

Within 5 feet of the house or other structures.

This area is critical - flaming brands/embers often accumulate here, providing sources of ignition for combustible materials such as siding and decking.

- Organic mulches have the greatest ability to ignite and burn and should not be used adjacent to structures.
- Inorganic materials such as gravel, brick chips, pavers, and concrete offer superior fire-resistance and should be used where mulch directly abuts flammable structures and around propane tanks.
- Organic debris often accumulates on top of inorganic mulches and needs to be removed each year with a leaf blower or rake.



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Table 1. Ignition and Flammability Rating of Commonly Used Mulches*					
	Ignition and flammability ratings				
	Low	Medium	High	Study**	Notes
Organic Mulches					
Composted wood chips		X		1,3	Smoldered.
Med. pine bark nuggets		X		1,2,3	
Pine needles (straw)			X	1,2,3	
Oat straw			X	2	
Wheat straw			X	3	
Tahoe chips		X		1	By-product of Lake Tahoe Basin chipping operations; consists of pine needles, wood chips, bark, and other plant biomass. Size and texture of chips varied and depended on the material being chipped.
Tahoe chips + retardant	X			1	
Shredded pine bark			X	2,3	Smoldered
Shredded red cedar			X	1	
Shredded hardwood		X		2	
Shredded cypress		X		2	
Composted garden waste		X		2,3	
Ground recycled pallets (sawdust)			X	2	
Cocoa shells		X		2	
Mixed grass sod	X			2,3	Must be well irrigated and mowed short. Long, dry grass has the same flammability ratings as wheat straw and pine needles.
Inorganic Mulches					
Shredded recycled rubber***			X	1,2	Made from 100% recycled rubber dyed and processed to look like redwood mulch.
Brick chips	X			2	Organic debris accumulated on brick chips did burn, but not sufficiently to carry a flame.
Decomposed granite	X			3	Same.
* Table 1 compiled by author from three cited studies.					
** (1) Quarles, S., et al. 2011; (2) steward L.G., et al. 2003; (3) Rogstad, A., et al. 2007.					
*** Shredded rubber products were classified as organic mulch in one study and inorganic mulch in another.					

From 5-30 feet of the house or structure.

This area should be kept clean and green. Since organic mulches are able to carry fire across an area and often smolder, it is recommended that they not be used in a widespread or continuous manner.

- A green, closely mowed lawn provides excellent fire-resistance. But long, dry grass has the same characteristics as wheat straw and pine needles and must so be maintained to keep its fire resistant characteristics.
- Plant materials should be carefully selected and grouped in islands surrounded by well-watered lawn or concrete or gravel paths.
- Islands can be mulched to conserve soil moisture and control weeds.
- Organic debris should be removed as it accumulates.

More than 30 feet from structures.

Separation from structures provides opportunities to use different practices.

- Mulches with higher ignition and flammability ratings can be used, though smoldering and ignition is still a problem.
- Trees and shrubs should be pruned up to decrease chances of ignition from organic mulches.

Not at all!

Some of the materials tested were so highly ignitable and flammable that I see no use for them in firewise landscapes. These include shredded or ground rubber mulch products, pine, wheat, and oat straw, shredded bark, and sawdust.

For more information about firewise landscaping:

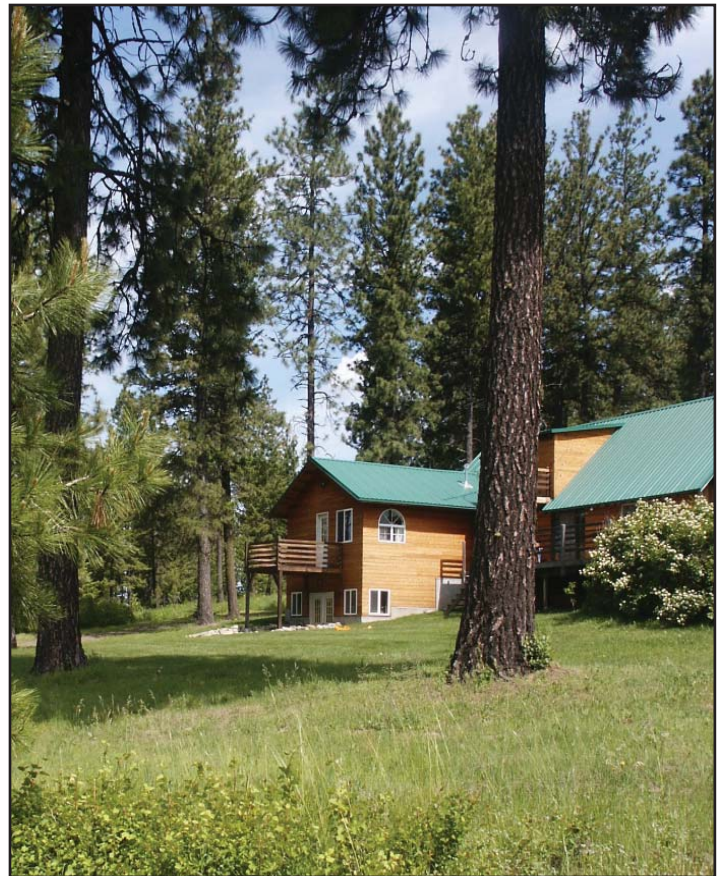
- University of Idaho Extension Forestry: www.uidaho.edu/extension/forestry/content/fire/wildlandurbaninterface
- Idaho Firewise: <http://www.idahofirewise.org/>
- eXtension Wildfire Information Network - www.extension.org/surviving_wildfire

References.

Quarles, S. and E. Smith. 2011. The Combustibility of Landscape Mulches, SP-11-04, University of Nevada Cooperative Extension, Reno, NV. <http://www.unce.unr.edu/publications/files/nr/2011/sp1104.pdf>

Steward, L.G., T.D. Sydnor, and B. Bishop. 2003. The Ease of Ignition of 13 Landscape Mulches. *Journal of Arboriculture* 29 (6): November 2003 pp. 317-320. IN: *Firewise Handbook*, Mississippi Forestry Commission, Jackson, MS. http://www.mfc.ms.gov/pdf/Firewise/Firewise_Handbook_2010.pdf

Rogstad, A., T. DeGomez, C. Hayes, J. Schalau, and J. Kelley. 2007. Comparing the Ignitability of Mulch Materials for a Firewise Landscape. AZ1440, the University of Arizona, Arizona Cooperative extension, Tucson, AZ. <http://cals.arizona.edu/pubs/natre-sources/az1440.pdf>.



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