

# Fertilizer Guide

## Using Wood Ashes in the Home Garden

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Wood ashes can be useful as a fertilizer and liming material in home gardens, particularly on acid soils low in potassium.

Wood contains a small proportion of mineral, or inorganic matter. When wood is burned, mineral matter is left behind as a white-gray ash. Hardwoods, or deciduous trees, when burned, produce a greater percent of ash than softwoods, or conifers. Within a given tree, different parts produce varying amounts of ash. Generally the percent of ash in the bark exceeds that of the branches with the branches containing more ash than the stem wood. The ash content not only varies with tree species or the part of a tree, but also with the age of the tree, season of felling and method of burning. For woods in temperate regions, the ash content usually ranges from 0.2% to 1.0%, occasionally approaching 3% to 4%.

Prior to World War II, wood ashes were used on a large scale on fields in the United States for their liming and fertilizer value. Wood ashes contain significant amounts of calcium and potassium and thus in addition to supplying calcium and potassium for plant nutrition have a liming effect on acid soils such as those found in Western Oregon. Potassium is often called potash because it is found in "pot ashes". Wood ashes also contain some magnesium and phosphorus, which are important plant nutrients. Originally, potassium and other salts were obtained by leaching wood ashes and evaporating the resulting solution.

### Chemical Composition of Wood Ash

When wood is burned, plant nutrients such as nitrogen, sulfur, and to some extent phosphorus are lost as gases. During burning most of the nutrient elements are converted to water soluble compounds such as oxides that are chemically suitable as fertilizer and lime. The concentration of elements is usually somewhat higher in ash from hardwoods than ash from softwoods.

### Calcium (Ca) and Magnesium (Mg)

Elements giving wood ash its liming value are Ca and Mg. These components are also important plant nutrients. Calcium often makes up 25% of ash, rarely dropping below 12%. Magnesium usually makes up 3% to 6% of ash. Both calcium and

magnesium oxides in fresh ash can react with water to produce hydroxides or with carbon dioxide to produce carbonates. Calcium and magnesium oxides, hydroxides, and carbonates are found in commercial liming materials.

### Potassium (K)

Potassium is found in wood ash as potassium carbonate and potassium oxide. The potash content ( $K_2O$ ) of wood ash varies from 10 to 35%. These compounds, like lime, have a neutralizing effect on soil acidity.

### Phosphorus (P)

The content of phosphorus (as  $P_2O_5$ ) in wood ash is usually less than 10%.

### Fertilizer Value of Wood Ash

The fertilizer value of wood ash depends on the type of wood burned. As a general rule, hardwoods weigh more per cord, yield more ash per pound of wood, and their ash contains higher percentages of nutrients than softwoods. The effects of these factors are illustrated in the following table, in which Douglas Fir represents softwood and oak represents hardwood. This table assumes that the wood is well cured (cured wood contains 20% moisture) and the numbers represent averages as there may be considerable variation between species and within the wood obtained from a single tree. Nevertheless, this table indicates that hardwoods produce approximately three times as much ash and five times as much nutrients as softwoods.

	<u>Douglas Fir</u>	<u>Oak</u>
Weight/Cord - lbs.	2500	4000
% Ash	1	2
Weight of Ash - lbs/cord	25	80
% Ca in Ash	14.0	25.0
% $K_2O$ in Ash	10.0	15.0
% Mg in Ash	2.4	3.0
% $P_2O_5$ in Ash	2.0	3.0
Amount Ca - lbs/cord	3.5	20.0
Amount $K_2O$ - lbs/cord	2.5	12.0
Amount Mg - lbs/cord	0.6	2.4
Amount $P_2O_5$ - lbs/cord	0.5	2.4

Ash from a cord of oak would meet the potassium needs of a garden 60 ft. by 70 ft. and ash from a



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cord of Douglas Fir, a garden 30 ft. by 30 ft. Both types of ash would contain enough calcium and magnesium to slightly reduce soil acidity. As a rule of thumb, 10 to 15 lbs. of wood ash could be annually applied to a 1,000 square-foot garden. Ashes should not be applied to garden soils which contain high levels of potassium.

#### How to Apply Wood Ashes

Elements in ash are water soluble. Therefore, ash should be stored in a dry place until ready for use. Ashes should be evenly applied and where possible mixed into soil and never left on the surface in lumps or piles. If ashes are concentrated in one place, excessive salt from the ash will leach into the soil, creating a harmful environment for plants. It is not advisable to add fertilizer containing nitrogen in the form of ammonium immediately after the addition of wood ash to the soil surface, as this can result in the loss of ammonia.

#### Plant Fertilizers

Where soils are acid and low in potassium, ashes are beneficial to most garden plants except those that prefer acid soil. Examples of acid-loving plants are: blueberries, rhododendrons, and azaleas. In the case of potatoes, use of wood ashes may cause potato scab. Wood ashes can also be applied to flower beds and shrubs. One-half to one pound of ash per year is recommended for each shrub and rose bush. Lawns needing some lime and potassium can benefit from wood ashes. No matter what type of plant, fresh ashes should not be added to newly germinating seeds.

#### Compost

Microorganisms breaking down compost material act best in an environment that is neither acidic or

basic. Wood ashes help maintain a neutral condition. Scattering a few ashes on each layer of compost material as the pile is built up will add nutrients to the compost and create a better environment for microorganisms.

#### Pest Repellent

Fresh, dry wood ash contains chemical compounds that readily absorb water. Insects therefore avoid wood ash since this material draws water from their tissue. Sprinkling ash around the plant tends to decrease the activity of insects causing surface damage. Adding ashes around the base of plants also decreases snail invasions as snails avoid crawling over dry salty material. Ashes can act to deter pests only when dry. Once wet, they are ineffective. Continued addition of wood ashes for this purpose is not advisable. As indicated previously, concentrating ashes in soil may create a harmful, salty condition for plant growth.

#### Unsuitable Types of Ash

Other ashes besides wood ashes have from time to time been added to soil. Coal ashes are not recommended because they provide little fertilizer value and may contain substances which are harmful to plants. Ashes from lead-painted or chemically treated wood should not be used either as lead and other elements may have a bad effect on plants. Similarly, ashes from fireplaces or incinerators in which trash has been burned should not be used, since harmful elements may concentrate in the soil. For example, boron, one constituent of glue in cardboard boxes and paper bags, may be present in amounts which would be toxic to plants.