# Why Posts Rot

## And How to Keep Them Standing Strong

■ By Jacob Prater

Putting a post in the ground is something most of us have done at one point or another, and it has been an important aspect of construction since the dawn of time. Whether it is a post for a building or a fence, you might wonder, "Why does it work out well sometimes and not others?" Or more plainly, "Why does that post rot?" The three essential ingredients to making wood rot are oxygen, water, and fungi. Our experience will be our guide in looking at each of these factors that make wood rot.

### The Science Behind Wood Rot

Have you ever seen a post that has rotted from about ground level down maybe 10 or 12 inches, but deeper it was fine and looked fine above ground? Deeper down there isn't enough oxygen, so the process of rotting is much slower. Above the ground line, there isn't enough water (the soil holds water next to the post). But the fungus that eats wood dwells in the soil near the surface. When you see a rotten log in the woods, you may have noticed but not registered a thing or two.

First, you may have noticed that some rotten logs look brown, and some rotten logs look whitish. These are two broad types of fungi at work, which also give us an idea about what the wood is made of. The fungi that leave brown rotten logs are referred to as brown rot fungi, which eat cellulose (a component of wood) and leave lignin (another component) behind. The fungi that leave logs looking whitish are referred to as white rot fungi, which eat lignin and leave cellulose behind.

You may have also noticed that not all logs rot at the same speed or in the same way in the forest. Oak rots from the bark inward (as many types of wood do), but

***Treated post rotted at the ground line.***
*PHOTO BY JACOB PRATER.*

birch leaves untouched bark tubes with rotten wood inside them. That birch phenomenon is quite interesting. It turns out that birch bark is waterproof and antifungal. In fact, birch bark was—and still is—used to prevent wood from rotting at ground-contact points, especially for cabin beams. Builders simply wrapped beams in birch bark at the ground contact points so the bark touched the ground instead of the wood. (It has to be protected and kept dry for this to work, though.)

Without oxygen, wood may be stable for a long time. I have some slabs from a tamarack log cut in the late 1800s, and they are in fine shape after being reclaimed from where they were embedded in a creek bank for over 100 years below the water table. I know this because the log still bore the stamp from the now-defunct logging company that cut it so many years ago. When we milled it, the log still had that characteristic Pine-Sol smell that tamarack has!

This preservation due to high moisture and low oxygen is also true of old logs pulled from deep water after sinking during the logging boom of the early U.S. These old-growth logs are often reclaimed and milled for specialty wood products due to their tight growth rings and exceptional durability. Essentially, in that low- or no-oxygen environment, there isn't much present that wants to eat wood. While you can prevent wood from rotting by excluding oxygen in a water-saturated environment, this isn't a useful method for most construction—unless you are building a dock.

For most construction purposes, your best bet to avoid wood rotting is to keep it dry. You've probably seen, and maybe experienced, an old barn slowly caving in. This process usually begins when the roof fails. Once that roof begins to leak, the structure will start to fail and rot wherever water seeps in and wets the wood. With this lesson in mind, you can see how critical the roof is—including overhangs—for keeping a structure standing a long time. Next to the roof, the grading of the building site to shed water away from the base is also important to prevent wood in ground contact from rotting, as it keeps the soil around the structure drier. (Drains and gutters also matter here.)

### Rot-Resistant and Treated Wood

Another way to improve your odds of preventing post rot is to treat the wood or select a species that is naturally rot-resistant. Where I grew up, there was a method to treat the bottom of posts that a friend in Wisconsin later referred to as the "Tennessee method" (I am from eastern Tennessee). Basically, you would char the bottom of the post in a fire. Posts treated this way were mostly of white oak to start with—tough, durable timber already resistant to water intrusion. (White oak has closed pores, while red oak does not and therefore rots easily.) The char coating covered the outside of the ground-contact portion of the post.

Char is resistant to fungal growth and insect attack. (Those pests can speed up or facilitate fungal entry.) The char may also help seal out moisture to some degree. Charred oak posts like this often lasted a century or more, especially if they had the added protection of a roof. Selecting a rot-resistant wood species can greatly increase the longevity of a post in the ground. Species such as Osage orange, black locust, and white oak are naturally rot-resistant.

Outside of harder-to-source woods such as cypress, redwood, teak, and some tropical species, Osage orange may be one of the most rot-resistant woods available in the Midwest for fence posts. Osage orange, commonly called "hedge" in Kansas, can make what amounts to a 500-year post. Yes, you read that correctly. It will outlast steel and concrete most of the time.

It's hard to find a straight piece of Osage orange for a pole, but you can find plenty of fence posts from the tree. This tough, durable wood was used by Native peoples for bows and even sparks when you cut it with a chainsaw! Its high density, large silica content, and natural rot-resistant chemicals in the heartwood make hedge, or Osage orange, the king of fence posts where it is available.

Black locust is another inherently rot-resistant species. You are more likely to find straight trees for poles with this wood, and you may even find commercially available black locust poles. However, it is most common to find it as fence posts. Black locust is dense wood, though not as dense as Osage orange, and it also contains rot-resistant chemicals in its heartwood. A black locust post might last up to 100 years.

The "go-to" in the construction world, however, is treated wood. Southern yellow pine is strong, light, and affordable. When pressure-treated, it gains the added advantage of rot resistance. A pressure-treated post will last five to ten years in the ground without any special treatment.

For most construction purposes, the first line of defense against wood rot is to keep it dry and away from soil contact. If that isn't entirely possible, then treating the wood (or selecting a rot-resistant species) that will touch soil is the next best step. Beyond this, ensuring the site sheds water—with a roof and proper grading—will go a long way in preserving wood from rot. **PB**

**Jacob Prater** *is a Soil Scientist and Associate Professor in Wisconsin. His passion is natural resource management along with the wise and effective use of those resources to improve human life.*

## THE CHAIN OF DECAY

There are four links to the chain of decay. Decay fungi need oxygen, a suitable temperature, moisture, and a food source to survive and thrive. To stop decay, at least one of these links needs to be broken. When wood is pressure-treated, the food source link is broken by a chemical preservative to envenom the wood fiber, so decay fungi can't feed. Oxygen, a suitable temperature, and moisture may still be present, but without fungal activity, there will be no decay. The issue with relying on chemical protection alone is that it doesn't last. That's why you see the utilities adding preservative to utility poles every six to eight years. Through weathering, aging, chemical migration, and volatility, the preservative loses its toxicity, making the wood fiber a suitable, desirous food source for the decay fungi. Like pressure treating, a plastic post protector targets the food source link by permanently separating posts from soil and soil-dwelling decay fungi.

***—Ken McDonnell, Owner, Post Protector***