Wood Decaying Fungi – An Insight on Types and Roles in Wood Decay
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Fungi can grow on almost any surface provided there is a source of nutrient present. All fungi require glucose for energy. This simple sugar is usually present in the environment in complex molecules that must be digested before the glucose becomes available for use in producing energy in the fungus. Nutrient sources (food) for some fungi must contain simple sugars or starches that are easily digested. Other fungi produce enzymes that allow the digestion of more complex sugar sources. These complex sugar sources include cellulose, hemicellulose, and lignin. In order to cause wood rot, a fungus must be able to degrade one or more of these compounds.

There are three major types of fungal induced wood decay: soft rot, white rot, and brown rot. The fungi producing these rots can produce airborne spores and influence air quality. However, they are primarily of concern because of their capacity to destroy the structural integrity of wood.

The soft rot fungi can degrade all three of the structural wood components, although the major food sources are cellulose and hemicellulose. A wide variety of fungi can cause soft rot, including the ubiquitous *Chaetomium*. For soft rot to occur, liquid water must be continuously present. Wood with soft rot is spongy. The most common sites for soft rot in buildings are wooden windowsills, and areas where roof drips continually wet wood materials.

The white rot fungi degrade primarily lignin. These fungi remove the lignin and leave the white cellulose. Wood that has been decayed by a white rot fungus is whitish, and stringy. Most of the fungi that cause white rot are Basidiomycetes and *Phellinus* (one of the Basidiomycetes) is a common white rot fungus. While the white rot fungi may form rhizoid-like strands, they are usually fine and fragile. *Phellinus* produces flat fruiting bodies on the surface of colonized wood, and can release basidiospores into the occupied space.

Brown rot fungi degrade only the cellulose in wood. In the process they modify the lignin, but do not use it for food. The rotted wood is brownish and both longitudinal and transverse cracks appear, giving the wood a cubed appearance. Only a few fungi can produce brown rot, and all are Basidiomycetes. *Coniophora* is a brown rot fungus that produces spore-bearing structures flat on the surface of continuously damp wood. This rot usually occurs on wood in contact with damp soil or other continuous water sources. Control of wet brown rot involves removing all of the rotted wood, and controlling the water source before the wood is replaced.

Some brown rot fungi cause what is incorrectly termed "dry rot". *Poria incrassata* and *Merulius lacrymans* are two Basidiomycetes that cause dry rot. These fungi form resistant rhizoids that can transport water for long distances. These can often be seen on wood surfaces as root-like strands that are somewhat rubbery when moist. If brown rot appears in a place where no obvious sources of water can be found, it is useful to test the wood's moisture content, and if moisture content is high, then try to trace the fungus to

the moisture source. Control of dry rot involves removing all of the rotted wood, and interrupting the source of water on which the fungi depend.

Other fungi will grow on wood, but generally do not cause structural damage. The sap stain fungi, for example, grow in the sugary sap of living trees or cut lumber. They may cause discoloration of the wood, but do not cause any other damage. While possibly unattractive, these fungi do not present an air quality concern, nor do they lead to rot. Many fungi will use wood exudates (sap) for food, since this is a source for soluble sugar. Also the common molds will grow on the surface of wood, possibly causing discoloration and affecting air quality, but not damaging the wood itself. These fungi can be removed from surfaces, and as long as water does not remain, will not return.

White and brown rot fungi can form fruiting bodies on the surface of colonized wood, and can produce massive numbers of basidiospores. If basidiospores are higher indoors than out on air samples, the possibility of wood rot should be considered, and the type of basidiospores explored more carefully.

In summary:

1. If windowsills or other continuously wet wood is spongy, suspect wood rot.
2. If wood is white and stringy, suspect white rot.
3. If wood is brown, crumbly, and cracked, suspect brown rot.
4. If no obvious water source is present, suspect dry (brown) rot.
5. If fungal growth is superficial and can easily be wiped away, suspect common mold.
6. If basidiospore concentrations are unusually high indoors consider the possibility of white or brown rot somewhere in the space.

References

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