

Blue Stain

**IS IT COLORING YOUR
BOTTOM LINE *RED* ?**



*A guide
to the causes,
identification
and prevention
of blue stain
damage in cut logs*





Blue stain is a discoloration in wood caused by certain fungi. These stains are often called sap stains because the fungi affect sapwood regions of trees where food and oxygen are found. For appearance grades, blue stain can greatly reduce the value of logs and lumber. This is especially true in products where the aesthetic or visual properties, such as a bright white appearance of the wood, is important.

Millions of dollars are lost every year when logs develop blue stain. Stained wood results in lower value or rejected wood products. Because our forest resource is vital to the state's economy and the livelihood of many residents, it is important to prevent blue stain.

Understanding blue stain problems will help you maximize the value of your logs and increase profits, create better relationships with customers, and contribute to healthy and sustainable forests in Wisconsin. Ignoring blue stain in the logs you provide to customers will have the opposite effect – lost profits and customers, sawmills that refuse your logs, a bad reputation for your business, and lost opportunities for marketplace advantages.

Blue stain and the bottom line: *A case study*

A sawlog with significant blue stain can have its value reduced by one-half to two-thirds. Consider this actual logging job conducted in 2000:

Tree Species Cut:

Hard and Soft Maple, Yellow and Paper Birch, and Black Cherry

Harvest Totals:

42,000 board feet of sawlogs (including some veneer)
and 212 cords of hardwood pulp.

Harvest Value:

Log Value (without stain)	=	\$ 24,088
Pulp Value	=	\$ 12,720

The Result:

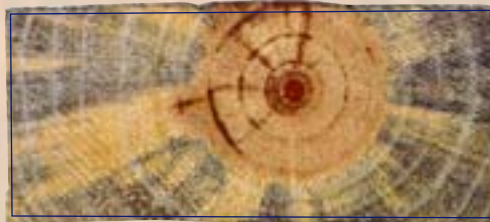
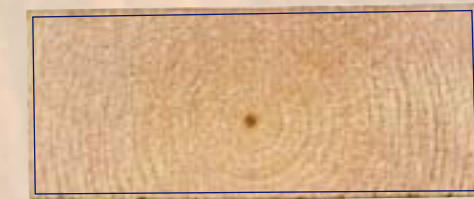
Harvesting began the second week of August. Pulpwood was hauled as it was cut. Sawlogs were not hauled until December. By this time, severe blue stain had developed in the logs. Originally valued at \$24,088, the presence of blue stain in the sawlogs reduced the actual value to \$8,400. By delivering the pulpwood first and leaving the sawlogs in conditions that favored stain development, the logger lost \$15,688 on this job.

What does it look like?

Most often, infected areas are blue, grayish or even black. However, many colors and shades may appear, including yellows, purples, and reds. Specks, streaks or complete discoloration on the wood's surface or ends of logs are also common. When viewed at the ends, logs with blue stain often have triangle-shaped wedges of discoloration. Lumber manufactured from stained wood often appears gray.



Do not confuse blue stain (top) with heart discoloration (bottom).



Stain can be striking and wedge shaped (bottom) when compared to a stain-free log end (top).



Log end, with blue stain.

What types of logs can be affected by blue stain?

Most tree species, both hardwoods and softwoods, can be affected. Special care should be taken when processing and handling white woods such as maple, basswood, aspen, ash, and birch. (Kitchen cabinets, furniture, flooring, and other wood products that may require "white woods" are at high risk for value loss.)

Blue Stain is also very common in softwoods such as Red and White Pine. Like hardwoods, conifers are susceptible to fungal spores floating in the air, but conifers may also become infected by bark beetles. After penetrating the bark of these trees, the beetles move into the sapwood. Here, fungal spores that have "hitchhiked" on their bodies come into contact with the rich growing environment found there. As the staining fungi grow, discolored wood results.



Spruce log with characteristic blue stain.



The variability of stain color and penetration can be striking.



Bore holes from maple taps can provide a convenient entry point for sap-staining fungi to become established.



Extensive stain in sapwood regions. One month old.

Is blue stain more of a problem at certain times of the year?

In an average year, Wisconsin wood is most at risk for blue stain from April until late November. During this period, temperatures and moisture are often favorable for stain fungi to develop and grow.



“Tax time to turkey time” is an often-heard guideline. However, northern regions of the state or locations near the Great Lakes can stay cooler more months of the year (shorter stain season), while other regions may warm earlier (longer stain season). So, different areas have slightly different time windows. The bottom line is that blue stain will develop whenever the required food, oxygen, temperatures, and moisture conditions are available to stain-causing fungi.



Logs left idle develop stain and lose their potential value.

How quickly can blue stain affect logs?

Under the right conditions (optimal temperatures, moisture, oxygen, and food availability) stain may develop in as little as three days. In a matter of weeks, stain can affect the outer foot at each log end.



Bark loss on this log during harvesting or transportation provided easy access to fungal spores and subsequent stain development.

What conditions promote growth of the blue stain fungi?

Temperatures between 70°F and 90°F are optimal for stain development, but the stain can develop at almost any temperature between 40°F and 130°F. Blue stain will develop when the moisture content in the wood is 22 percent or greater (although fully saturated logs are safe). Blow-downs or other catastrophic damage leaves trees downed, scarred, and exposed to fungal spores. In addition, stain is likely to develop in standing trees that are scarred or wounded during harvesting operations.

The good news is that blue stain can be controlled and even eliminated for many logs. Control can also be easy and economical. A variety of methods are available and generally it is best to combine several treatments to maximize control. The following suggestions can help prevent or slow blue stain in your logs, and could increase the profit on your next load of logs.



Timing:

- ◆ Process and transport logs to processing mills as soon as possible after felling (15 days maximum in summer and 30 days at other times). Assuming a tree has not encountered staining fungi prior to harvest, its risk for stain development increases greatly the moment it is severed from the stump. Under the right conditions, staining can occur only days after logs are infected.
- ◆ Harvest and transport logs when temperatures are below 40°F. The fungi responsible for blue stain cannot function at low or freezing temperatures.
- ◆ Deliver high-quality sawlogs to mills before pulpwood.



Chemical Treatments:

- ◆ If logs cannot be transported in a timely way, end-coating them may reduce stain risk for a month or two. End-coating involves applying a wax-like barrier to log ends or other areas where wood has become exposed due to bark loss. By slowing moisture loss, end coating has the added benefit of controlling end checking. Contact one of the organizations listed on the back of this brochure for more information on chemical suppliers and procedures. Some sawmills may be willing to share the minimal costs of end-coating.
- ◆ Apply a fungicide to the logs. Applying a safe, registered fungicide for this use to all surfaces of the log will kill stain-causing fungi. Contact one of the organizations listed on the back of this brochure for more information on suppliers and procedures.

NOTE:

Whether end-coating or using a fungicide, apply the chemicals within 24 hours after felling. The longer you wait, the less effective the treatment is!

Applying a safe endcoat to log ends will reduce stain and end checks.



Coated logs like this will limit costly stain and reduce end checking.

Water:

- ◆ Keep logs saturated with water. Water deprives stain fungi of the oxygen they require for survival. Sprinkler systems or ponds are ideal. The key is to keep all log surfaces wetted.

NOTE:

Keeping logs saturated is not a license to delay transport and processing. Logs kept wet for four or more weeks can produce gray or off-color lumber. Blue stain will still occur in logs not entirely wetted.

Cold Storage:

- ◆ Keep logs frozen if possible. Frozen logs are a barrier to the function of stain-causing fungi. Some new evidence shows that covering logs with snow and ice in the winter can extend the time before stain appears in spring and summer.



Keeping logs wet can deprive staining fungi of the oxygen they need to grow.

Careful Harvesting:

- ◆ Avoid careless harvesting techniques that cause excessive scuffing, scraping, or other bark damage. This is important for the trees harvested and the trees left for future harvests. Damage done to standing trees exposes them to fungal spores and will result in stained wood. This means lesser-value trees on the stump in future harvests.
- ◆ Pile logs carefully so that air can move freely through the stack. At log landings where there is full exposure to sunlight, orient log ends in an east to west direction.
- ◆ Do not mix logs that clearly have stain problems with those that do not.



Tight piling and the lack of end coating, water or fungicidal treatment has led to stain development that is sure to spread through this stack.



Damage to trees during harvesting provides avenues for sap staining fungi to become established. The result? Lower value logs in future harvests.

The following organizations and individuals can help answer questions and provide additional information about blue stain and other log degradation problems.

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The publication can also be viewed and printed from pdf format on the web at **clean-water.uwex.edu/bluestain**

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