

# Chapter 1:

## Preparing Logs for Inoculation

### Selecting the Wood Species

Tree species selected for shiitake cultivation influence the overall yield of mushrooms and the likelihood of contamination. Oaks and members of the oak family, especially red and white oaks, are the best species for shiitake cultivation. However, recent research also includes yellow poplar (*Liriodendron tulipifera*), ironwood (*Ostrya virginiana*), American hornbeam (*Carpinus caroliniana*), sweetgum (*Liquidambar styraciflua*), northern red maple (*Acer rubrum*), and paper birch (*Betula papyrifera*). White and red oaks, American hornbeam, hard maples, and sweetgum are probably the most productive species. Availability of tree species will vary with location. In southern climates, avoid soft hardwoods such as aspen and willow because of the increased likelihood of contamination problems and low yields. Conifers such as pine, spruce, fir, and larch should not be used in any climate.

The site on which trees grow can influence the nutrient content of logs. The best shiitake logs come from trees grown on fertile sites. The trees selected for shiitake cultivation should be living, healthy, vigorous specimens free from any obvious insect or disease problems when cut. However, the success of a tree species for shiitake production can ultimately be determined only by cultivation of the mushroom on that species in a specific environment or climate.

If you look at the cut end of a log, you can usually see two shades of wood color. The outer portion of the log is bark and cambium (Figure 1). The lighter, inner wood is the sapwood; the darker wood in the center is the heartwood. Shiitake grows best in the sapwood and cambium because they contain the most readily available nutrients and have higher moisture content than the heartwood. Trees with large sapwood areas and small heartwood are preferred for shiitake production

not only because of the high nutrient content in the sapwood but also because it is difficult for shiitake to break down heartwood material.

### Felling of Trees

When leaves fall off trees, the sap flows down to the tree roots. In the winter, the sap generally does not flow, and in the spring, the sap rises through the trunk and stems to the leaf buds. During dormancy, the sapwood contains high sugar levels and the bark is tighter. Therefore, trees should be felled during the dormant season. This is the period from about half color change in the canopy in the fall to before bud swell in the spring.

Trees should be cut about 2 weeks before the intended time for inoculation. If inoculated sooner, the trees' natural chemical defenses against



**Figure 1.** The sapwood and cambium are sources of nutrition for shiitake. The larger the sapwood area, the more productive the log will be.

invasion may still be active and could prevent the shiitake fungus from growing.

## **Cutting Wood to Size**

Avoid damaging the bark because it creates an opportunity for other invading fungi to enter. Just before inoculation, the trees can be cut into suitable lengths for logs. Log lengths can vary from 3 to 4 feet, and the diameters can range from 2-1/2 to 10 inches. Logs that are 40 inches long and between 2-1/2 and 5 inches in diameter are easy to handle and are the most productive.

In dry climates with less than 40 inches of precipitation per year, logs cultivated outdoors ideally should be in the 4- to 6-inch diameter class. Smaller logs dry down rapidly resulting in poor spawn run. In most climates, however, some type of moisture supplementation is required for logs during spawn run and before fruiting.