BOUCHARD COOPERAGES

French, American and Eastern European Oak Comparison

What Does Oak Do?

The most common answer is that oak adds complexity. Oak barrels can offer a simple wine greater depth and dimension, and elevate a great wine to a higher level.

The sensory influence of wood on wine is primarily due to oak lactones, vanillin, and a collection of volatile phenols.

The following are descriptors often used to refer to the contributions of oak, in no particular order:

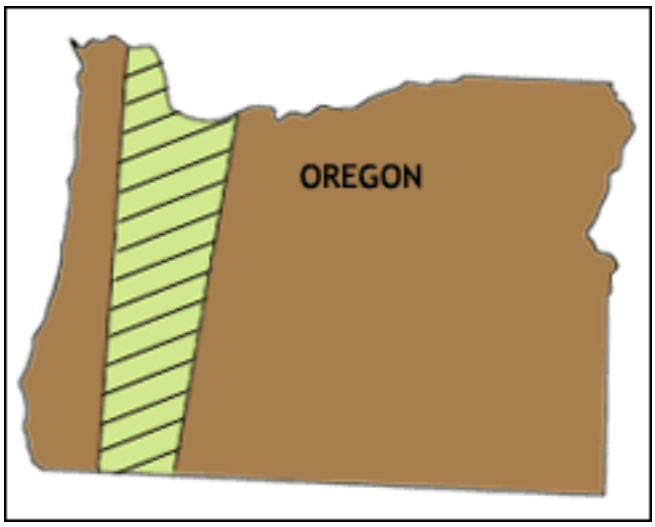
- Vanilla
- Pencil shavings
- Dusty
- Nutty
- Bourbon character
- Coffee
- Toasty
- Smokey
- Cedar
- Cigar box
- Baking spices
- Coconut
- Sawdust
- Diacetyl / butterscotch
- Green (herbaceous)
- Sappy (resin, turpentine)

The Significance of Forest Origin

The oak barrel contributes to wine quality in several ways, beyond its long-time use as storage and transport vessel. Most important is its role as flavor enhancer, which is what makes the subject of forest origin (and their different flavor contributions) so interesting to winemakers.

The Variation in Oak Species

Oak is the common name for over 300 species of trees belonging to the genus Quercus. Oaks are widely distributed, and prolific, throughout the temperate regions of the Northern Hemisphere and at high elevations in some parts of the tropics.



Of the many species, only a few are suitable for cooperage for the simple reason that they must be non-porous (i.e. not leak). The most common oaks of Europe are Quercus petraea (also known as Q. sessilis) and Quercus robur (Q. pendunculata). In the United States, the predominant species is Q. alba, while Q. gerryanna (commonly referred to as Oregon oak) plays a small but increasingly important role.

Until about 25 years ago, oak was oak and little consideration was given to its origin. Today, a great deal of importance is placed on oak origin, not only origin by country but by specific, often quite small, areas within a country. This particularly applies to oak from France, possibly because it is only in this country that the regions of origin have been carefully defined. There is interest and great strides that have been made towards identifying the most significant regions for cooperage quality oak in the United States.

So, just how Important is Oak Origin?

Just as terroir is important in premium wine grapes, it is equally important in fine oak barrels.

There is no doubt that the origin of oak has a unique effect on wine matured in a barrel made from its wood, but is it THE most important factor, AN important factor, or a MINOR factor? Here is where the debate begins . . .

Most coopers and winemakers will agree that the most significant factor is the manner in which the cooper handles his oak. The cooper's "thumbprint" -- how the cooper seasons and stores the oak so it dries adequately, and how the barrel is fired -- sticks out above all other factors. This thumbprint or "house style" characterizes each barrel, regardless of other variables, including forest origin.

Yet there exists no consensus as to what is the next most important factor . . . is it forest origin, is it tightness of grain (regardless of forest origin), is it the amount of air-dry time, or is it yet another factor. This does not even touch on the influence of the winemaker and how he treats the barrel and the wine he puts into it. No two winemakers handle their barrels or wines the same way.

Reliability of Oak Supply

While oak may become available from exotic sources from time to time and in small quantities, availability of commercial quantities on a regular and continuing basis is most important. If not readily available, oak from a specific region cannot be reliably used. There are many competitive uses for high quality oak, such as veneer and furniture. Oak for cooperage purposes is more expensive to mill, and it requires specialized processing skills and proper cutting.

Changing political realities also affect ongoing oak supply, as evidenced by the changes in Eastern Europe in the 1980s.

These factors strongly influence which forest origins the cooper chooses to promote, and the resulting choices for the winemaker.

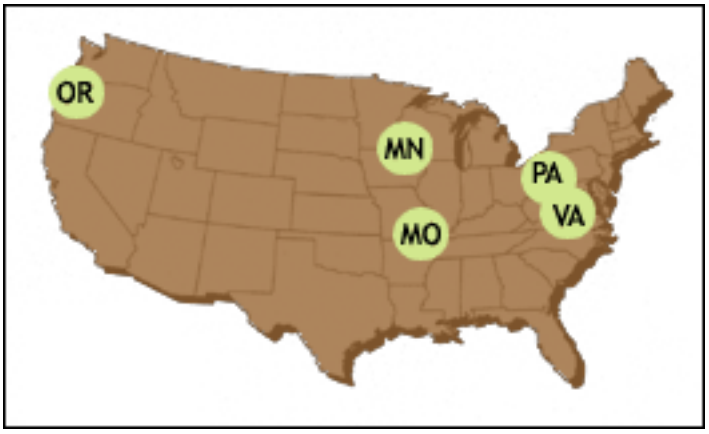
American White Oak

Barrels made from American white oak were originally produced for the bourbon industry. However, American oak barrels are increasingly being used by wineries, particularly given recent improvements in barrel fabrication and of course simple economics (top quality American oak barrels typically cost about half as much as their French counterparts).

American oak barrels have improved dramatically over the last ten years. In the past, only varieties with intense flavors such as Cabernet Sauvignon and Zinfandel were able to stand up to the more aggressive aromas and flavors that the American oak available at the time contributed. The reason for these dominant flavors was partly due to how the oak was coopered and seasoned.

Barrel makers have implemented changes based on their observations of French oak coopering techniques, involving longer air-dry time for the staves and toasting the barrels longer with more penetrating heat. These changes have transformed the character of American oak, rendering sweeter, subtler flavors and less dominant coconut and herbaceous notes.

Until recently, no effort was made to identify American white oak (Q. alba) by its specific area of origin. A guess could be made of the provenance by identifying the mills at which the oak was cut. A recent study observes that white oak forests of the eastern U.S. exist in four "eco-regions" or climatic zones, of which the "Eastern deciduous forest region" is the most vast (see map). Preliminary results from this study indicate definite sensory differences, which are now being explored on a larger scale. A few coopers are currently offering Q. alba barrels from oaks grown in specific areas of the eastern U.S. and the Great Lakes area, while other coopers prefer to focus on grain tightness as the most important factor in determining flavor contributions.



The theory is that regional designations for American oak would give winemakers more choices and greater control in matching barrels with certain regional characteristics to their winemaking style.

The Technical Reason why American Oak seems more "Oaky"

When comparing oaks from France and the USA, tests indicate that French oak gives about 2 1/2 times the extraction of total phenolics, but American oak adds more flavor and perfume on a comparative basis. However, the

reason why American oak gives more oakiness in the wine per unit of extract is apparently due to the higher non-tannin phenolic fraction, which is approximately 21% as compared with 14% for French oak.

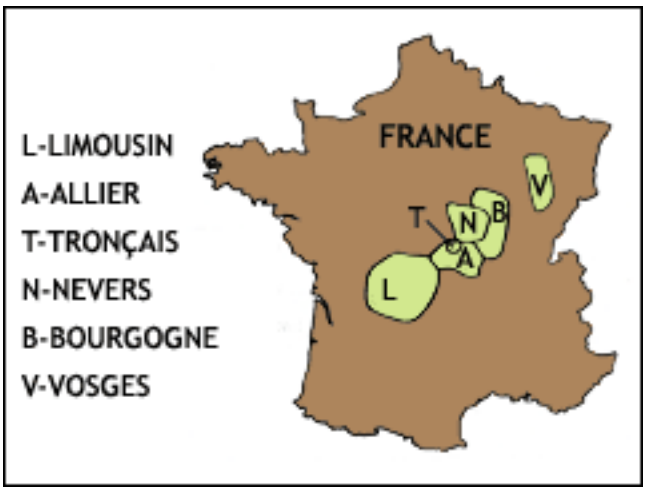
French Oak

In France, the predominant species used by coopers are Quercus petraea (also known as Q. sessilis) and Quercus robur (Q. pendunculata). Oak in France tends to grow on its own, although it does occasionally mix with small quantities of beech and other trees. Oak hybridizes naturally, and at last count there are at least 400 hybrids. Because of this, there is uncertainty among botanists as to oak identification in France. For this reason, oak from France is carefully identified by its region of origin, even though the specie may be the same.

Most of the forests of France (approximately 80%) are owned by the French government, and are managed by the Office National de Forêts, established by Napoleon II. All trees are sold by auction, prior to being cut. Oak trees for cooperage purposes are harvested when they are between 110-150 years old.

French Forest Origins

In France, special designations indicate the regions where oak has been cultivated and cut for centuries to produce vessels used to store wine and spirits. There are at least six major forest origins or regions that are commonly specified:



Limousin (li-moo-sahn) oak comes from the old French province of that name in the southwest of France, and is predominantly Q. pendunculata. The toughness and coarse (open) grain of the wood is a result of poor growing conditions, which tend to restrict vertical growth in favor of a shorter, larger diameter tree trunk. In France, Limousin is used almost exclusively for the maturation of Cognac.

Nevers (ne-vere) oak comes from the many forests of the Nievre Département in the center of France. The region is gently rolling and the soils are rich and moist. This oak is predominantly Q. sessilis. The trees grow tall and straight in forest conditions, which produces logs that are generally medium-tight grained.

Allier (ah-leay) oak comes from the Département of the same name immediately to the south of Nievre. The oak is fairly similar to that of Nevers, although usually more tight-grained in structure.

Tronçais (tron-say) oak differs in that it comes from a specific forest within the Allier Département. It is the best known of a number of forests deliberately planted for the ship building trade in the late 17th century. The forest is spectacular, growing in deep, fertile soils producing trees of great size with a very fine grain. The Tronçais forest is not large, and its limited production is in great demand by winemakers.

Bourgogne (boar-go-nya) oak comes mainly from the forests of Cîteaux, to the east of Nuits Saint Georges in the Département of Côte d'Or. Its characteristics resemble Limousin oak, but is medium-grained.

Vosges (voej) oak comes from the low mountain region in the northeast corner of France. The trees are tall with narrow trunks and the timber is medium-tight grained. This oak, which only became commercially available in the late 1970's, is increasingly in demand.

Eastern European Oak

Oak from the Baltic states, Serbia and particularly Hungary was very highly prized by barrel makers in the nineteenth and early twentieth centuries. The oak species throughout a crescent-shaped area, ranging from northern Portugal up through France to the Baltic states and down through Hungary and Romania, belong to the Quercus petraea and Quercus robur families. Yet a good deal of diversity in flavor and structure is evident depending on the precise microclimate, soil structure and density in which the trees grow.

Traditionally, the oak of the Hungarian forests of the northeast was highly sought after by French coopers. The taste of French oak, now considered integral to the flavor of red Bordeaux, was not appreciated in Bordeaux's traditional market in the early and mid-nineteenth century. Winemakers preferred the softer, smoother texture Hungarian oak offered their wines, perhaps because less charring of the barrels was practiced. The substitution of French oak for Baltic and Hungarian oak was prompted by political difficulties, including the Napoleonic wars.

A ready supply of Hungarian oak was once again available in the period spanning the late nineteenth century up to World War II, only to be cut off by changing political realities. It is only in the last twenty years that trade has been reestablished with French coopers.

In the Czech Republic, barrel production was primarily for the beer industry. The wine region of southern Moravia did require some cooperage for wine, but until recently, barrels were viewed only as storage vessels. Oak flavor in wine was considered undesirable. The development of export markets has encouraged more wine barrel production, and in depth studies of Bohemian and Moravian oak are now underway.

In Russia, the southern region of Adyghe, near the Black Sea, has been identified as having a large source of Q. sessilis. The less expensive cost of wood from this area has stimulated much interest.

Oak Origin Flavor Characteristics

The following flavor characteristics can at best be considered generalizations, and are the personal observations of the editor, Roberta Manell Montero.

Limousin (li-moo-sahn) perfumes and colors the wine (yellow-gold) rapidly with little finesse. Limousin tends to be fairly aggressive and "simple" on the palate, but adds an attractive vanillin note.

Nevers (ne-vere) contributes a spicy, almost cinnamon-like flavor, although it can initially seem aggressive in tannin if not toasted enough.

Vosges (voej) offers a sweet, subtle vanillin aroma that complements a fruity character. Above all, it offers a softer texture on the palate.

Allier (ah-leay) releases its perfume slowly with finesse, and seems to have a spicier oak component. It is well suited to red and white wines.

Tronçais (tron-say) located in Allier, releases its perfumes even more slowly, and offers a high level of finesse on the palate. It is typically the tightest grained French oak, which explains its slower rate of extraction.

Hungarian oak offers very similar flavors to French oak, but its most attractive characteristic is a soft, creamy mouth texture (especially early in the wine's development).

Czech oak has a sweet, nutty flavor with moderate but complex tannins. Most interesting is a floral note, which has been described as similar to mimosa, a sweet flowering tree from southern France.

Russian oak imparts a more intense flavor than French oak, but with a similar flavor profile, and is perhaps not as sweet on the palate.

American white oak is more aromatic and obvious in its wood character. Sensory descriptors range from dill and coconut to smoky and sweet vanilla. Q. Alba does offer more weight and intensity on the palate, but its overt character sometimes clashes with more delicate wines.

Oregon oak is quite different from American oak, and descriptors commonly used include toasty, resinous, caramel, coffee, spicy and herbal. It is slightly more phenolic than French oak.