

What Does "Grain" Really Mean?

Some seventy meanings clarified

by R. Bruce Hoadley



What we commonly call grain is the result of exposing the tree's annual rings on the surface of a board. With a ring-porous hardwood such as ash, the large earlywood cells are sliced lengthwise, resulting in bands of distinct lines.

Seldom can a discussion about wood get far without the use of the word "grain." Yet grain is such a versatile word that its many accepted meanings are often confusing, and sometimes even contradictory. A woodworker who says "I don't like the grain of that board" could be talking about any number of things. Most likely, he means the board's *figure*, the visual pattern on the board, but he could also be talking about the *slope of the grain* (too much slope weakens a board), or about the way the board grew in the tree—a luthier, for example, senses that an *edge-grained* piece of spruce is stiff enough for a guitar top, a *flat-grained* piece isn't.

Here are some seventy phrases involving specific meanings of the word grain. They are all the result of two variables: the way the tree grew and the way it was sawn.

Planes, surfaces and direction—"Grain," first and foremost, commonly designates the alignment of the longitudinal cells that comprise the bulk of wood tissue, as shown above. *Grain direction* is a better term when used in this sense. We speak of wood splitting *along the grain* or *with the grain*, meaning parallel to the fibers; *across the grain* means generally perpendicular to the fibers. Surfaces cut parallel to the grain direction are called *longitudinal grain* or simply *long grain*, as opposed to *end grain*, which is the surface perpendicular to the fiber direction.

Grain can also refer to the position of the growth rings with respect to both the plane of cut and the appearance produced. For example, a tangential surface—parallel to the growth rings—is said to have *tangential grain*. This term is also applied to boards whose widest surface has this orientation. Synonymous

with tangential grain are *flat grain*, *plain grain* and *slash grain*. If the surface is perpendicular to the growth rings, it is said to have *radial grain*, that is, the wide face of the board was oriented on a radius of the tree stem. *Edge grain*, *vertical grain* and *quarter grain* are flexible terms, but they all represent grain that is more radial than tangential.

Obviously, boards can be cut with varying degrees of grain orientation. In commercial lumber, *flat grain* includes boards with growth rings oriented at angles of 0° to 45° to the wide face; *edge grain*, 45° to 90°. *Bastard grain* indicates that the growth-ring placement is clearly neither flat grain nor edge grain, but somewhere in the 30° to 60° range. *Mixed grain* refers to a quantity of lumber that includes assorted edge, flat and bastard grain in any combination. *Side grain*, as the opposite of end grain, can mean any of the above long-grain surfaces, and it sometimes indicates, confusingly, flat grain only. In boards or panels, the better of the two surfaces is sometimes referred to as *face grain*.

It is generally assumed and expected that the grain direction is parallel to the long axis in boards, dowels and turnings. Such pieces are said to be *straight-grained*. Deviation from this ideal is termed *cross grain*. The degree of cross grain is expressed as *slope-of-grain*. A slope-of-grain of 1 in 12 indicates that grain direction deviates 1 in. away from the board's axis for every 12 in. along the surface. Severe cross grain is called *steep grain*, and pronounced deviation from the surface plane, especially in veneer, is called *short grain*. When the axis of a board is not parallel to the growth rings, the result is called *diagonal grain*. *Dip grain* indicates an undulation in the grain direction, as typically occurs in the vicinity of a knot.

A board may be cut straight along the axis of a tree, but grain direction in trees is not always straight up and down. For example, within a straight stem, the fibers may have a helical alignment, referred to as *spiral grain*. Any board sawn parallel to the stem (or log) axis will likewise have spiral grain. In some species the stemwood has spiral grain that alternates cyclically from right to left, producing *interlocked grain*.

Various other characteristic patterns of distortion in grain direction can develop in the tree. These result in distinctive patterns on machined surfaces. For example, *curly* or *wavy grain* produces a washboard surface when split radially, and the barred visual effect produced when the wood is machined smooth is also called curly or wavy grain. In maple it is sometimes called *tiger grain*, or *fiddleback grain* because of the traditional choice of such wood for the backs of violins.

Grain and figure—If we are speaking primarily of fiber orientation, as we have been, "grain" is the word to use; if we are referring to the wood's surface appearance, it is more meaningful to use the word "figure." The following grain patterns produce characteristic figures when the wood is surfaced.

Intergrown cell structure in the crotches of forked trees is called *crotch grain*. In certain species, such as black walnut, if the crotch is sawn down the middle into two Ys, the pattern is aptly called *feather grain*.

Bulged or bumpy growth layers are called *blister grain*, and produce blister figure when sawn tangentially. If the blisters grow elongated rather than round, the grain is called *quilted*. *Leaf grain* and *flame grain* are somewhat showy tangential cuts resembling their namesakes.

Sometimes wood grows in localized tight swirls and dimples. In maple, *bird's-eye grain* results. When a piece of bird's-eye maple is split tangentially, one surface will have numerous little peaks, and the other will have corresponding craters. When surfaced, the figure resembles lustrous, deep eyes. *Dimpled grain*, characteristic of lodgepole pine, splits similarly. Another spot-like figure occurs in burls, a result of dormant-bud proliferation.

Interlocked grain, surfaced radially, results in bands of light and dark that shift back and forth with changes in light direction. The resulting figure may be called *ribbon* or *stripe grain*. Roe figure is similar, and the grain, also interlocked, may be called *roey*.

More properly called "figure," some "grain" depends on the characteristic patterns produced by the rays when the tree is cut radially. When the ray flecks are conspicuous or particularly lustrous, the wood is called *silver grain*. *Rift grain*, occasionally called *needle-point grain*, is produced on a longitudinal surface oriented 30° to 45° to the rays, the term being used especially for white oak with its large rays; the term *comb grain* is used where the vessel lines are parallel to the board's edge and produce a uniform pencil stripe.

Grain and surfacing—When wood is being planed, it tends to split ahead of the cutting edge. On a board with cross grain, the splitting will follow the direction of the fibers, either running harmlessly up and away from the surface or running troublesome into it. Thus we prefer to plane *with the grain* rather than *against the grain*. If we go wrong, *chipped* or *torn grain* results. In most wood with a pronounced figure, wood fibers are intergrown in various directions or at steep angles. This is why figured wood is more difficult to work.

When flat-grain surfaces at a high moisture content are machine-planed, or when knives are dull, denser latewood may

rise above adjacent earlywood. This surface unevenness (which is most pronounced on the pith side of flatsawn boards of uneven-grained softwoods) is called *raised grain*. If the growth rings actually separate, *loosened* or *shelled grain* results. When we saw or plane wet wood, or hardwoods with reaction wood (tension wood), the fibers may not cut cleanly, and the frayed, fibrous surface that results is called *fuzzy* or *woolly grain*.

Earlywood and latewood—Visual contrast between earlywood and latewood is expressed as evenness of grain. Southern yellow pine and Douglas fir thus have *uneven grain* because of their distinct growth rings, while basswood has *even grain*, because its growth rings are barely discernible. In softwoods, visual contrast parallels workability—an uneven-grained carving block usually means jumpy cuts.

In describing growth-ring width (rate of growth), as in structural grading of lumber, narrow rings are termed *narrow grain*, *close grain*, *fine grain* or *dense grain*. Wide rings are described as *wide grain*, *open grain* or *coarse grain*. To add to the confusion, similar terms are often used to indicate relative cell size or permeability. We hear the terms "open-grained" and "coarse-grained" used to describe woods that have large cells and absorb finish readily, but the term "texture" is preferable in reference to relative cell size. Woods with large cells should be called *coarse-textured*; woods with small cells, *fine-textured*. Much of the confusion about grain can be avoided by using clarifying adjectives or by substituting a more appropriate term such as texture, figure, or growth-ring placement. For example, following popular usage, one might be tempted to describe a given piece of ash as being both close-grained (if growth rings were narrow) and open-grained (because of its large pores). It would be better to describe such wood as "slow-grown" and "coarse-textured."

Other miscellaneous uses of the word grain appear from time to time. Some are doubtless local in origin or use. *Short-in-the-grain*, for example, has been used in Britain to describe wood prone to brittle fractures. When an individual is lacking a specific term to describe a particular aspect of wood, the word grain is readily pressed into service to fit the situation at hand. An ambiguous term such as *tight grain* might be used by the cooper in reference to white oak (whose "water tightness" is due to tylosis-filled vessels), by the ébeniste in reference to maple (based on its fine texture), or by the violinmaker to describe fiddleback figure (where the bars are closely spaced). Various other uses seem to have been coined to fit the situation at hand—one reads of clear grain, wild grain, swirly grain, variegated grain, or grain character; these terms have little specific meaning to me. I've also heard people say, "The grain runs a bit," and "The grain is heavy." I'm not sure what these statements mean, either.

Getting to the end of my list, there is *graining*, which is the texturing or painting of surfaces to imitate natural texture or figure. At its best, graining is a fine art; on the other hand, the plastic cabinet on my TV set warns of "simulated wood-grain design," and I suppose this is part of the category, too. Other meanings of grain get us away from wood, and concern themselves with cereals, weight tables, and beaches. I suppose I've missed a few, but for now the thought of inventing any more uses for this overworked word sort of . . . well . . . goes against *my grain*. □

R. Bruce Hoadley is a contributing editor to FWW. An excellent pamphlet, Figure in Wood: An Illustrated Review, is available from Research Information, 101 Comer Hall, Auburn University, Ala. 36849 (\$2.00ppd.).