9. Hardwood Trainers:

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Hardwoods meet most of the criteria, some species more than others. A few grow too fast and big, and some too slow. One big plus for some hardwoods is there established local markets and high value. A downside for hardwoods is their competitive crown shape. The different shapes and growth speeds can likely be put to good use with a good plan of spacing, timing, and crop tree release. Such a plan will likely take more seedlings and more work than using conifer trainers, but there would be a market for the later trainers when their task is done.

Hardwoods	TOTAL	SHADE	SITE	GROWTH	JUGLONE	SIZE	SHAPE	SUPPLY	RANGE	pH 5.5 to 8	MARKET	COMMENT
Black Walnut	8	0	1	1	1	1	0	1	1	1	1	
Am. Chestnut	8	1	1	1	1	1	0	0	1	1	1	doomed
Ash	8.5	1	1	1	1	1	0	1	1	1	0.5	doomed
Black Cherry	9	1	1	1	1	1	0	1	1	1	1	fast
Black Locust	7	0	1	1	1	1	0	1	1	1	0	poor shade
Box Elder	8	1	1	1	1	1	0	1	1	1	0	low value
Ch. Chestnut	3	1	1	0	0	0	0	0	0	1	0	short
Elm	7.5	1	1	1	1	1	0	0	1	1	0.5	doomed
Hard Maple	9	1	1	1	1	1	0	1	1	1	1	plus syrup
Hickory	8	1	1	0.5	1	1	0	1	1	1	0.5	shell bark okay
Red Maple	8.5	1	1	1	1	1	0	1	1	1	0.5	
Red Oak	8	1	0	1	1	1	0	1	1	1	1	slow in bottoms
Silver Maple	7.5	1	1	1	1	0	0	1	1	1	0.5	too fast
Sycamore	7.5	1	1	1	1	0	0	1	1	1	0.5	too fast
Tulip Poplar	8	1	1	1	1	0	0	1	1	1	1	too fast
White Oak	7	1	0	0	1	1	0	1	1	1	1	upland species

Figure 1. A matrix showing the author's guesses of various hardwoods meeting the trainer criteria on a West Virginia bottomland site.

The above matrix poses various hardwood species against the good trainer criteria. I just stuck my quick-draw opinions in there without any research. If one was planning to use hardwood trainers in a new planting, it would be wise to build such a matrix and spend some time filling it in.

I do have a few data points:

1. Tulip Poplar planted concurrently 10 feet away will suppress black walnuts – eventually to death.
2. Tulip poplar planted concurrently 14 feet away out-grew the black walnut and will not prune black walnut's lower limbs soon enough requiring manual pruning.
3. Black cherry planted concurrently 14 feet away out grew the black walnut.
4. In southern Ohio, Bill Hammitt showed us an area where even-aged box elder have done a good job training black walnut. This is the best hardwood training I have seen. The box elder were

natural seeded and they are really thick (like 3-foot spacing). Somebody cut all the trainers down before they were done with their training job. So the walnuts look great up to point, then they have reverted to their branchy ways.

We have tried several broadleaf species as trainers. Our experience has been all bad, because our trainers were too far away when needed. (But bad experience better than no experience.) To be effective early on, the same-age trainers would need to be very close to our future crop trees. Larry Krotz is experienced in this even-aged high density approach. See "Our Legacy Forest – Larry Krotz" under the "Black Walnuts" tab on the www.thescalepit.com website.

Keep in mind that our goal in this document is to grow veneer quality black walnut, not veneer quality of some other species. On a good black walnut site, an even-aged dense mix which includes tulip poplar, black locust, black cherry, sycamore, or silver maple will likely end up without black walnuts. These species are a little too aggressive and would need to be suppressed or delayed planting to give the black walnut a start. Of course, black walnut itself has ideal speed height-wise, but produces too little shading. Regarding other species as trainers, ask Larry. He has planted everything that will grow in north Iowa. A crucial point for using non-walnut trainers is that walnut produces a beautiful sparkling shade, but unfortunately, it is not dense enough to shade out the lower walnut branches while they are small. Without dense shading trainer species, we are left with manual pruning our walnuts for any hope of growing veneer quality.

Bruce Wakeland likes broadleaf trainers for black walnut in northern Indiana. I'm sure he gets an improved black walnut stem quality over a monoculture planting. Bruce lets tulip poplar trainers grow to merchantable size before removing them.

Harlan Palm, a retired forester from Missouri follows an approach he calls "Managing the Competition". Here Harlan tells of his good experience using close by hardwood trainers:

" I got started with the idea while releasing volunteer walnut (age 20 – 60 years) along 4 creeks. I saw many walnut trees with 30- 40 feet of clear trunks and straight as an arrow. The intriguing challenge is to learn how to enhance or increase the number of high quality trees that are generating veneer quality logs that are potentially 20 – 40 feet in length. The bark ridges are relatively straight with no evidence of catfacing scars."

"On one of the farms that I have been managing uneven aged volunteer walnut growing on Landes and Haymond Silt Loam along a creek. The trainer competition consists mostly of fast growing sycamore and soft maple along with some ash and elm. I am "Managing the Competition" in a way that reduces the amount of necessary pruning on the walnut. The adjacent competition shades out the lower small branches that shed without leaving a catface scar.

I coppice the adjacent competition so that the walnut have about 15% height advantage over the competition. I do not apply any herbicide to the cut stump that may be several feet tall. Several sprouts emerge from the coppiced junk tree which shades the lower portion of the walnut stem. During subsequent years I coppice the fast growing shoots that are starting to catch up again with the walnut. Eventually I start to cut the junk trees and treat the stumps.

Chapter 11 will focus on trainer spacing and timing with the assumption that the selected hardwood trainer species produces dense shading and matches black walnut's vertical growth rate. The growth balance between trainer and crop tree vertical rates is very much site dependent. The best course

might be to use a shotgun mix of hardwood species, and then react based on real observations. Pre-planting soil information is key to projecting black walnut site suitability – usable depth more so than chemistry. Chemistry and pH are hard to adjust to tree root depth and over tree life spans. Better to pick species that like the site as it is, rather than try to modify the site to suit the species - just look around.