08.   Trainer Criteria

A. Why Trainers?

The goal of this document is to describe a silvicultural method that can reliably produce veneer quality black walnut trees. Any successful method will be all about training very young black walnut trees. The first few years of growth creates the skeletal heart of the future butt log – hopefully of veneer quality. Black walnut is a shade-intolerant species. Black walnut trees will grow healthy and bushy in the open, but normally will fall behind and die if in a forest understory. Like most agricultural crops, we are going to create an un-natural environment. We are proposing to trick black walnut to grow tall and straight, like a utility pole with a bush on top. The market wants long clear black walnut stems, but walnut has little interest in tall clear stems. We are going to use trainers to do the work for us – to remove small lower branches, to force trees straight up to uncomfortable heights. This is a complex and challenging idea.

Healthy open growing black walnut trees have some nasty habits in the eyes of a veneer buyer. 1. Terminal leader failure is common. 2. The vertical growth rate is slow. 3. Side branches are large and lasting.   In other words all that is expected from a shade intolerant species growing in the open where it belongs. The correct application of trainers can eliminate these veneer-unwanted characteristics.

Species and individual trees that tend to grow with a bold and persistent central leader are said to have an "apical dominant" growth habit.   Apical dominance is common in tulip poplar, but rare in black walnut. There is more discussion of apical dominance in Chapter 13 "Genetic Source", but we will discuss how to force apical dominance onto trees that are not usually interested in apical growth.

Figure 1. A pole-sized black walnut with basal shading from surrounding white pine trainers

 "Shade intolerant" means that the tree cannot compete or even survive under a closed forest canopy. The canopy is not closed above the tree shown in Figure 1. This tree is almost, but not quite under a closed canopy. It can see full daylight overhead. It only has one direction to go. It will survive and eventually defeat the trainers.

To get black walnut terminal buds to stay healthy and to encourage vertical growth, the young trees need to have clear sky above, but be surrounded and crowded by taller trees. In our 14 x 14 foot spaced equal-age monoculture black walnut plantation, less than 5% of the trees are apical dominant. Where we have pine trainers with a head start, almost every walnut is apical dominant.   The walnuts need to be in "catch-up" mode. They need to be convinced that they are threatened from the sides.

Figure 2. A black walnut seedling catching up in height with older white pine trainers

There were some pleasant observations in white pine trained plot:

When the shading geometry was right, the young black walnuts (like the one in Figure 2) shot up as much as 11 feet in one growing season.   Later, when these trees were 4 or 5 inches in diameter, I searched for small side branch scars. On many trees I could find none. I wonder if such "growth spurt" trees ever had any side branches. When the rapid apical growth occurs, it is surrounded by thick pines, it is almost impossible to get access, let alone a good picture of this phenomenon.

B. Trainer Species Criteria

As was shown in the preceding chapter, **Black walnut is an unsuitable trainer for black walnut.** So, what species characteristics will make a good black walnut trainer? Some of these criteria will lead to downright rejection of a species for black walnut training. Others characteristics are just nice to have.

1. **SHADE:** The trainer species foliage should produce dense shade, with light transmittance of .88/ft. or less. Most healthy temperate tree species can achieve this foliage density, except black walnut and probably black locust.
2. **SITE:** The trainer species should thrive on good black walnut sites. Black walnut is a bottom land species, so look for species that grow where healthy black walnuts grow.
3. **GROWTH:** The trainer species' height growth should equal or slightly challenge black walnut's height rate. The trainer should also be a fast starter, so the required shading can be in place without too many years of crop tree planting delay.
4. **JUGLONE:** The trainer species should be largely resistant to soil juglone produced by the black walnut. Again, look for trainer candidate species growing right next to black walnuts. It is okay it trainer species is slowly killed after 20 years. They need to be removed anyway.
5. **SIZE:** The maximum size of the trainer species should be comparable to the maximum size of black walnut. Sun flowers could train young black walnuts, but we want the training to last for many years and follow the black walnut up to maximum height.
6. **SHAPE:** The trainer species must provide shade for the lower part of the black walnut's crown must not obstruct the black walnut's view of the sky overhead. Ideally we want deep shade on the bottom of the walnut's height plus threatening shade above and tapering away from the walnut's growing tip.
7. **SUPPLY:** The trainer species should be available from state or wholesale nurseries, without going too far north or south. A lot of trainers are required, so retail nursery prices could be painful.
8. **pH:** Black Walnut thrives over a wide pH range from 5.5 to 8.0 The trainer species is likely to be more fussy. For example: Black walnut grew well on a pH 7.3 site, but bald cypress was the only conifer grew well there. The other conifers didn't even survive.
9. **RANGE:** The growing site is within the native range of the trainer species.
10. **MARKET:** Some trainers might be removed after they reach merchantable size. It would be an added bonus if the trainer species had a reasonable local market. This would be nice, but not essential.

These criteria are not all equal in importance. The first 8 are rather essential. "Range" and "Market" are just frosting. In the next 2 chapters the various hardwood and conifer species are examined against these criteria. The entries into the criteria matrix will very much depend on the intended growing locale. Clear out my entries in the matrix and put in entries for the intended locale. It will take some research and local knowledge. Start the list by checking available species at nearby state tree nurseries.

It is a good idea to plant a mix of the top scoring trainer species. Species that don't like the site will show their dislike in the first year. Then replant voids and losers with "winner" species the second year. There is not much use to replant after year-2. Trees that are 2 years behind get dominated and fall further behind. They rarely can catch up.