

CREATION OF KNEES ON BALD CYPRESS

By Randy Bennett

I'm sure that I am not the only one who has been successful growing knees on bald cypress in bonsai culture. But as far as I know, no one else has written much about it. One thing that I have seen practitioners do to try and create knees is to take small roots, pull them above the soil surface and wire them together to form a loop. There are several tree species native to swampy areas that naturally form "looping roots".



However, a looping root is not the same thing as a knee, nor can you form them in that manner. So I hope that this information is helpful. Before we get into the method that I use to develop knees on bald cypress bonsai, let's talk about a couple of topics relating to knees.

There are two areas of discussion: first, the purpose or function of knees and second, what causes them to form. Now it may seem like the two are synonymous, but in truth, they are very different. The first area for discussion, the purpose or function of cypress knees, is one that is still up for debate. Various hypothesis have been postulated on the purpose or function of cypress knees: oxygen intake for the tree during extended periods of high water, increased structural support in unstable soil, vegetative reproduction, a means of releasing methane, a means of accumulating nutrients from the water, and as a mechanism for storing carbohydrates. A few of these have clearly been disproved, such as a means of releasing methane and that their function is for vegetative reproduction. As for the others, there is still no definitive explanation for their purpose.

There have been many research studies conducted on this topic. And like so many other topics of research and study, one can find studies to support or disprove just about everything. The fact is, that after 200 years of research, there is still no universally agreed upon purpose for cypress knees.

Whether their function is aeration of the root system, storage of carbohydrates or something else entirely, is not as important for us as bonsai artists as to know how to create knees, keep them in scale with our bonsai and keep them alive. I will talk about all three. This brings us to the second area for discussion: what causes knees to form in bald cypress. There are a couple of pieces to the puzzle that you first must have. First, research has confirmed that bald cypress trees will begin to form knees when they are about 12 years old. So, first and foremost, you have to secure a cypress that is at least that old, if not older. Second, cypress knees only develop from surface roots.



They do not form from roots that are deeper in the soil, but strictly from the topmost roots. This is great news for bonsai artists in that it means that we can develop knees while growing our cypress in bonsai containers. Third, I have observed that knees tend to form 'en masse' when a tree is in pot culture. That is to say that, if a tree develops 10 knees, they all tend to form in a single growing season and will grow quite rapidly.

Let's think about when we see and, more importantly, when we do not see, cypress knees developing. Most obviously, we see cypress knees developing in the swamps, along the banks of slow moving rivers and bayous. In this type of environment, knees will average between 6 to 36 inches in height, although they have been seen in some areas growing 8 to 10 feet. The record is 14 feet.



We see them develop on dry land where the water-table is within a few feet of the soil surface. In this type of environment, we will typically see knees that range from 2 to 12 inches on average.



We do not see knees develop on cypress growing in deep water.



We do not see knees develop on cypress growing on high ground.



And we do not see knees develop in pot culture. The one mitigating factor that results in the formation of knees is ...water. And water at the right depth in relation to the roots.

Bear with me while I share a few observations regarding bald cypress bonsai. There have been many of my students, peers, teachers and mentors, during the past 40+ years that have developed excellent bald cypress bonsai. But only one developed a cypress bonsai with a knee and that was Vaughn Banting. The tree below was one of Vaughn's and is now on display in Washington D.C. It is the one cypress he developed having a knee. It served as a model for all future flat-top design in cypress and I recently learned that the knee on this cypress has died. The tree is in good health, but the knee died. I found that very interesting and feel that it

confirms a theory I have incorporated into the care of my own cypress to help ensure the health of my tree's knees.



One of my former bonsai students and I began experimenting on developing cypress knees in pot culture about 26 years ago. The following practice for developing cypress knees in bonsai culture is a result of that effort. There certainly may be others who have achieved success by using variations on this theme, this is simply the method I use.

AGE – Make sure that you collect a tree that is at least 12 years of age. Here in the New Orleans area, we collect our cypress in January. Cypress tend to leaf out early in our climate and may already be leafed out by February. Today is January 6th and it is 72 degrees outside. It is not possible to know the exact age of a collected cypress, but if you talk to people in the nursery trade, they will tell you that bald cypress in the ground grow 1 to 2 feet a year. So I recommend collecting a specimen that is at least 12 to 18 feet tall, just to be on the safe side. You will have two to three years of growing in a container before knees will develop anyway, so you are pretty safe going with that height. If you are collecting a blunt and fluted variant, which typically grow in more open areas, it will be impossible to know the age. But if you have a buttressed base, you can be pretty sure that it is older than 15 years.

SOIL - All of the artists I know pot their cypress in bonsai soil (with the exception of my former students). There is nothing wrong with that. Bald cypress is an extremely adaptable species and will maintain vigor and excellent health in bonsai soil with routine care and maintenance. However, it is not conducive to developing knees. Let me correct that; it is not necessarily counter-productive to developing knees, but it **IS** counter-productive to maintaining their health. When I pot a newly collected cypress, I do so using Miracle Grow Potting Mix with Moisture Control. The moisture control components keep more moisture in the soil than other potting mixes. I use it during the knee development stage and at every repotting, to maintain as much moisture in the soil as possible for the health of the knees and the tree as a whole. After all, their native environment is in standing water. Cypress like an acid soil and you certainly get that with the vast organic composition of the Miracle Grow. You may certainly pot

your cypress in bonsai soil and still develop knees through water inundation. It is soil inundation with water that causes knee development, not soil composition. However, once knees are created and you remove your bonsai from the water reservoir, bonsai soil will not retain sufficient moisture to ensure that the root mass remains wet throughout the day. It is my contention that excessive water absorption in the tissue is not only the reason cypress trunks develop a buttressed base, but also why knees form. And while there are plenty of roots below the surface to supply a cypress with water, if there is insufficient water in the soil to sustain the swollen tissue of the knees, (which only develop from surface roots) they will eventually abandon that root structure because the reason for its initial development no longer exists. This is why you do not see knees develop in routine pot culture. And this is what I believe happened to Vaughn's cypress in the national collection. If you are determined to keep your cypress in bonsai soil, then you will need to maintain the bonsai pot in a water reservoir in order to keep knees healthy.

POTTING – I immediately pot newly collected cypress into a bonsai container appropriate to the trunk size and estimated finished height. I use a chainsaw to achieve a flat base in order to get it into a pot. I determine the front based on the nebari or buttress and anchor it into the container. Once the tree has been properly potted in Miracle-Grow Potting Mix, the tree and bonsai pot are placed in a plastic mortar tub.

WATER – The mortar tub is filled with water up to, but not above, the rim of the bonsai pot. The water level is maintained daily throughout the year(s). It is essential to check the water level daily in the heat of summer. Between evaporation and the trees' uptake of water and transpiration, the level may drop a couple of inches in a single day. Remember that water is the catalyst for developing knees. Once the knees develop to the desired height, remove the bonsai pot from the mortar tub or water reservoir.

FERTILIZING – Following the emergence of new growth, follow whatever fertilizing regimen you normally use. I use organic fertilizer as soon as leaves begin to emerge.

PRUNING – With the front of the tree established and potted in a bonsai container, I carve the trunk in back of the apex into an elongated convex shape. This facilitates the formation of callous tissue in such a way that there is no unsightly ridge along the edge of the large cut. The cut, once healed over, will maintain the curved contour of the trunk. Once shoots emerge, I determine which one will be my apical shoot relative to the front of the tree and rub off those that emerge in the immediate vicinity, to avoid competition for growth. Next winter, I may have to come back and readjust the carving at the back of the apex, depending on where my apical shoot emerged. However, from my experience, that is seldom necessary since they tend to pop at numerous locations along the edge of the angled convex cut I carve when the tree is first potted. You can select shoots that pop on the trunk for the future branch structure and begin to wire when the tissue hardens off, but do not prune the apical shoot. It must be allowed to grow unchecked. This will facilitate healing of the large cut, but more importantly will begin to generate a lot of roots due to all the new growth.

KNEE DEVELOPMENT – It is important to understand the following component of knee development: your tree must become root-bound. On a collected trunk, such as I have described, this usually takes 2-3 years. It is the combination of water inundation in the soil and the pot becoming root-bound that facilitates the formation of knees. Leave the tree in the water reservoir until the knees have reached a size that is proportionate to the tree. The knees will tend to grow quickly and may shoot up several inches in a single growing season. My observations would indicate that growth is retarded if not stopped completely when the bonsai container is removed from the water reservoir. You will be able to tell when the tree is becoming root-bound when you see roots growing in the bottom of the water reservoir. But maintaining the health of the knees is critical. Do not deprive them of the source of their creation – excessive water in the soil. In the heat of summer, you may find it necessary to place the tree back into a water reservoir, but if you use a potting mix that maintains moisture in the soil throughout the day, it will not be necessary.



I hope this helps.