

## **JULY 5, 2016 RMBS PRESIDENT'S CHOICE PRESENTATION**

### **BASIC CONCEPTS OF PINE DEVELOPMENT AS BONSAI:**

In contrast to other plant species used for bonsai, such as junipers, the strength in pines is in their roots, not their foliage. This is important to consider because it means that we can significantly reduce pine foliage, through candle cutting and needle plucking, and the tree will not be endangered; it will bounce back. On the other hand, we have to be especially careful when repotting pines to maintain as many fine feeder roots as possible and *never* to bare-root the tree.

What are our objectives in developing and styling pine bonsai? Typically, we are striving to reduce needle length and internodes, especially on long-needled species such as Ponderosa, and to increase overall foliage ramification. This assumes, of course, that the basic structure of the tree is established, in terms of overall shape and branch selection, although we may still want to allow certain branches to run in order to thicken.

How we accomplish these basic goals, and how we balance the energy within the tree will vary depending on the type of pine we are dealing with. It is especially important to understand the difference between **single-flush** and **multi-flush** pines (i.e. the difference between pines that only generate one growth flush per season and those that, with proper care, will generate two).

The important concept to remember, whether we are dealing with single-flush or multi-flush pines, is that, given the fact that these trees are growing in a confined container, there is only a finite amount of energy that the root mass can generate. To the extent that we distribute that energy over a larger mass of foliage, that foliage will become shorter and more compact.

### **DEVELOPMENT AND REFINEMENT OF MULTI-FLUSH PINES:**

There are a limited number of pine species that will generate more than one flush of growth per season, but, in my opinion, they are some of the most interesting and beautiful trees. Multi-flush varieties are Japanese Black Pines (*Pinus Thunbergii*), Japanese Red Pines (*Pinus Densiflora*), Virginia Pines (*Pinus Virginiana*) and Pitch Pines (*Pinus Rigida*). These trees will generate a second flush of growth if their emerging candles (new shoots before they open) are cut in the late spring or early summer. Here's how we do it:

In the early spring (or late winter if the tree is in a protected environment) we reduce the number of needles throughout the tree, by plucking, to equal the number on the weakest significant branch. In no case, however, should the number per branch be less than 10-12 pairs, even if the number on the weakest branch is less. The purpose of this needle reduction is to balance the distribution of energy

throughout the tree, a very important concept in developing pines. At that point, we begin to fertilize heavily to stimulate the growth and emergence of new candles at the terminus of each branch.

Remembering that these are multi-flush pines and those new candles will be cut in early summer, we continue to fertilize up to about four weeks before the candle cut date. So, if we plan to cut the candles the first week in June, we stop fertilization the first week in May. Why do we stop fertilizing? The purpose of early spring fertilization is to stimulate the growth of new candles; but if we continue to fertilize after the candles are cut, the new shoots that follow will generate long needles and long internodes – just what we are trying to avoid.

When we do the de-candling, there are several ways to proceed. I have been trained to cut all of the new candles at the same time, to the same extent, no matter what their size or where they are located on the tree. We cut them down to their base and leave only a couple of millimeters at the bottom of the candle. Within a month or so after cutting, we will see the emergence of two new buds at the base of that cut, or even more if the tree is really vigorous. Those buds will grow into new shoots, so we now have two new shoots in place of the one. If you extrapolate this process over several years, you can see where this will expand new shoots and branchlets over the entire tree, yielding a much more fully ramified plant.

There is another theory of candle-cutting that suggests that the candles on weaker branches (typically those that are lower on the tree) should be cut first, and the ones on stronger branches cut about ten days later. The idea behind this theory is that cutting the weaker branch candles will give those new buds a “head start” and will serve to further balance the energy distribution overall. There is nothing wrong with this process as long as you remember to come back and cut the stronger ones within the prescribed time-frame.

Once the candles are cut on a multi-flush pine, further needle plucking should reduce the number of old needles on each cut site to four to six pairs; this will further channel the tree’s energy to producing the new buds. After that, the tree should basically be left alone, except for watering, for the next several months while the new buds are emerging and elongating. No fertilizing, no pruning and no needle plucking – just don’t touch. The one exception to this rule is that an opportune time for wiring the tree is immediately after candle cutting but before the new buds emerge. Once the new buds emerge it is too late to wire because they are very fragile and susceptible to damage.

After the new shoots have elongated and hardened off, about the end of September or early October, shoot selection should occur and older needles will be further plucked to reduce them to six-eight pairs. This involves examining the site of each new shoot cluster and reducing to two shoots that are ideally of equal strength, lateral to one another and presenting an acute angle between them (for optimum

branch placement). At this point we can again begin to fertilize aggressively to prepare the tree for overwintering and setting new buds for the spring.

In the following spring the process starts all over again. Over the course of several years, if the tree remains healthy and strong, this process will yield a much denser, better ramified tree with shorter needles owing to the fact that energy is distributed to a larger foliage mass.

## **What do we do if we acquire new multi-flush stock?**

If we acquire a raw piece of multi-flush pine stock generally this will be nursery stock or field grown trees because most multi-flush pines are not indigenous to our environment, especially in Colorado. The first thing we need to do is to balance the energy in the tree by needle reduction on every branch down to the number on the weakest significant branch, but not lower than 10-12 pairs of needles. At this time it may be appropriate to remove unnecessary or unwanted branches as well, especially if you have a general idea about how the tree will be styled. If it is early spring, the new candles have emerged, and the tree is strong, they can also be cut thereby setting the pattern for how the tree will be developed moving forward.

## **DEVELOPMENT AND REFINEMENT OF SINGLE-FLUSH PINES:**

Single-flush pines are Ponderosa (*Pinus Ponderosa*), Limber (*Pinus Flexilis*), Pinyon (*Pinus Edulis*), Lodgepole (*Pinus Contorta*), Japanese White Pine (*Pinus Parviflora*), Scots Pine (*Pinus Sylvestris*), Mugo Pine (*Pinus Mugo*) and others. Developing these trees, many of which are native to Colorado, as bonsai is completely different from the process for multi-flush pines, but the objective is the same: *distribute the tree's energy over a larger foliage mass in order to yield shorter needles, shorter internodes and more ramification.* We just do it differently.

**FOR A RECENTLY COLLECTED SINGLE-FLUSH PINE:** All of the procedures outlined below apply to a recently acquired or collected tree that we are in the process of developing into bonsai, not for trees that are already styled and are only being maintained and refined over time.

**First Year** - In the first year collected trees may or may not push new growth. If you don't see evidence of new growth in the first year, don't do anything to the tree; just let it grow. In the second year, if it produces buds in the Fall, in the Spring of the third year we begin to fertilize, moderately, **to facilitate development of roots.** Seeing the color change of buds in the Fall, and evidence of new growth, indicates that the roots have caught up and are ready to produce new foliage. Fertilizer should be applied Spring through Fall.

If the collected tree **does** show signs of new buds and pushing growth in the first year, all of the above procedure can be accelerated by a year.

**Second Year** – Spring through Fall, we fertilize to develop and expand our foliage mass. Needles will grow long, but that's OK (needles are solar panels). By Fall of the second year we should see back-budding. **That doesn't mean that we prune or pluck or anything!**

**Third Year** – Spring through Fall, we fertilize to develop back-buds into needle masses.

*(Don't pluck any needles for the first three years! Let the terminal growth run to encourage back-budding, then the terminal growth can be cut back to stimulate the growth of the back-buds.)*

**(Repot the tree into a bonsai container between the third and fourth year)**

**Fourth Year** – Stop Spring fertilization, going full bore into needle reduction. Fertilize only in the fall. If you fertilize in the Spring of the fourth year, you are encouraging needles to elongate; so don't fertilize till the Fall.

**Fifth Year** – (same process as fourth year). Remember that, after two years, old needles will drop naturally or be so loose that they can be removed easily. So by the third year, the first-year needles will be gone, and by the fourth year the second year needles will be gone. By the fifth year, all of the needles will be shorter.

**FOR A REFINED SINGLE FLUSH TREE** – Maintain the shape and density of the tree by pinching candles when they are very soft supple and green, in the Spring, to keep the profile of foliage pads. But be sure to retain at least two new needles at the base of each candle. If you don't, that branch will stop growing and may die.

Auxin is a hormone that suppresses the growth of needles behind it. It is the hormone that results in trees becoming apically dominant. Pinching the new buds eliminates the effect of the auxin. May have to pinch the secondary buds that grow after the first bud was pinched.

If we want to go even a little further with the discussion of single-flush development and refinement, we can make a more subtle distinction between short needle pines and long-needle pines, as follows:

**SHORT NEEDLE** – Zuisho, Scots, Shore, Lodgepole, Pinyon, Mugo.

**Technique for development is pruning; technique for refinement is pinching.** Pinching allows us to redirect and redistribute energy into the shoots behind the terminal shoot. You need to pinch the new candles **before** the new needles on the candle begin to emerge. And, you should literally pinch, not cut; they should break off. The problem with letting the terminal shoot grow, harden off and then prune is

that the strength of the terminus will cause the end of the branch to thicken and destroy taper.

Once the old needles start to fall off, you can prune the terminal shoot, but leaving at least a few pairs of needles. This will redirect the energy back to the emerging, smaller back-buds. Again, this is suppressing the auxin from the terminus to the back buds.

### **How do we balance energy in short-needle single-flush pines without plucking needle mass?**

1) Pinch to redistribute energy; but there can be situations where the upper branches are stronger, so we pinch the stronger ones and potentially leave the lower candles alone to increase needle mass.

2) If we allow the weaker shoot candles to continue growing and hardening off, we can then **prune** later in the year to again redirect energy. But we may **not** do this if we simply want to increase needle mass or allow the branch to elongate.

**LONG NEEDLE SINGLE-FLUSH**– Japanese White Pine, Ponderosa, Limber and others.

### **How do we balance energy in long-needle single-flush pines without plucking needle mass?**

**No pinching – why?** Because remaining needles would become unusable (too long). **So the technique for long-needle pines is pruning!** We wait until the terminal growth has hardened off (in the fall), then we prune the strong shoots and redirect energy to the back buds. Often the apical areas will gain much more strength over time, so in the fall (say September) we can go in and prune the strong terminal shoots (and not leaving any needles, in contrast to the technique for short-needle single flush). This will serve to redirect energy to the shoots behind it.