CLIMBERS' CORNER

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Pruning for Preservation

By Guy Meilleur

The following article advances from "Restoring Trees, One Branch at a Time," originally published in the June 2010 issue of *Arborist News*. Reviewing the previous article first will help set the context for what is to come: A focus on pruning methods specifically designed to preserve older, veteran trees. At first, such trees might look "over the hill," "overmature," or "like a ticking time bomb," but tree owners who know what's going on behind and beyond appearances generally prefer preservation.

"Plan the work, and work the plan" is excellent advice for physically getting around in the tree, and for first mentally planning the work once you get there. "Pruning objectives shall be established before pruning," the ANSI A300 pruning clause reminds us. Then, "the arborist shall clearly state what is going to be done to achieve the objective." The arborist is most qualified to write the pruning assignment, and specify the methods, as well as the location, density, and size of branches. These specs are best transferred from supervisor to climber in written form, so nothing is lost in translation. Climbers want to be sure the specs are clear to them before ascending!

Objectives

Some genera and species develop with a central leader (excurrent) while others naturally tend to a more open form (decurrent). For established trees, a primary goal is conserving that structure while managing growth. When growth rate of a tree in the forest slows, the tree is "overmature." Profit decreases, so it may be time to harvest the commodity in the wood.

In the urban forest, slower growth is an advantage, a sign that it's time to preserve structure while managing the tree's increasing ecological and aesthetic values. Shifting into "tree time" view, the aging process is survival mode, a new and indefinitely long phase in the tree's development. Research and practice around the world is pointing to a list of criteria for selecting the locations of pruning cuts on older trees. The objective of this article is to examine different methods of pruning, when the objective is longevity.

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Hollow and old, but lively: The knight of Schoenenbourg, France planted this *Tilia* tree in 1101, in thanks for coming back healthy and wealthy from the first of The Crusades. Local farmers did the natural crown reduction, like they do it with their fruit trees, every 20 to 25 years. DBH is 13 ft (3.9 m), height 66 ft (20 m).

Gear Up!

A second rope helps you balance on small wood, and maneuver from side to side in a wide crown. A long lanyard does the same in tight situations. A tool pouch fits on the back of the saddle, so you barely know it's there. A few light tools can enable you to make the right cuts in more situations that your handsaw can handle:

- Hand lens, to identify dormant buds, fungal structures, insects, and other little objects with potential pruning significance. Some magnifiers come with lights, which can bring out more detail.
- Chisels with rounded edges, to avoid extra damage. These are good for cleaning rough edges of wounds, and reaching where saws cannot, into concavities created when codominant stems are cut.
- A small hammer, to strike the chisels, and also to "tap test" for decay.
- Hand pruners/secateurs, for making small cuts cleanly. These can also fit into pouches that are attached to scabbards.
- A camera in a protective case, a soft measuring tape, and other gear may be useful, depending on the work specifications.

Trees, like people, have a tendency to spread as they age. Even with an aerial lift, pole saws, and yes, pole pruners are often needed to make the small cuts. One method is to carry the pruner head on the back of the saddle, and swap it with the saw head (in its scabbard) per need. A pole hook is also handy for advancing or redirecting your rope, but only if

the rope is not exposed to nicking from an exposed blade. (Voice of experience: Does anyone want to buy two 100-foot sections of like-new climbing line?)

Hands On

Trees must be touched to be understood! (A. Shigo) You may want to wait until no one is watching, but running bare hands over the areas of interest can tell you a lot that other senses cannot.

Nodes, concentrations of vitality, can be sensed by changes in taper, wrinkles, collar-like bulges, and other structures indicating bud protection zones. You can use your hammer to verify that the bulges are not from decay, and your hand lens to assess the brightness and fullness of dormant buds. This vitality could indicate a natural pruning target.

Where there is a large branch collar that you are cutting to, your hands are better than your eyes at finding the edges of the bulge, the change in taper that is the pruning target. Collars on some species are steep, and some incomplete. When your hands-on examination leaves doubt about the capacity for wound closure, you might decide to cut farther out, to reduce rather than remove. The fingernail can be a handy tool to nick the outer bark and look for the green in the living cambium, and the bright white of healthy sapwood. Fingers then feel for moisture and slickness, and the nose can pick up on sweetness in the sap. There is a lot more than visualizing to Visual Tree Assessment!

Pruning Veteran Trees

Photosynthetic Potential

Harvesting sunlight is how the tree makes food, so make sure the next year's growth will satisfy its appetite, without forcing an emergency reaction. Sprouting is typically an indicator that too much was removed, and the tree is out of balance. Foliage (bud) removal maximums of 25 percent of mature trees or 10 percent of older trees are reasonable guidelines—not rules—to keep in mind. For trees in precarious condition, less is better. But trees have their tricks, as arborist Tom Dunlap discovered while playing with his catalpa tree early one summer. After he thumbed off the swelling buds on one side of a lower branch, much to his surprise, remaining buds grew leaves double the normal size!

Bud thinning is also done in peach orchards to increase the size and quality of fruit, by decreasing the number of fruit. The manual method would be time-consuming, so branches are struck by blunt tools, such as plastic baseball bats. Shaking branches of shade trees is typically done to free hangers, and it can also be a good way to study biomechanics. Heavy ends dip and pull. The fulcrums of these overextended lever arms are natural targets for pruning cuts.

Natural Form

Trees are sometimes grouped into architectural models, typified by a familiar genus, each with its own growth habit. Firs (*Abies*) maintain a single trunk until old age, when other leaders naturally arise. Competing leaders in maple (*Acer*) trees often are reduced, "subordinated," into side branches, to increase health and stability. But spreading trees cannot easily be forced to single leaders; their natural habits resist it.

Because of forces (friction and gravity) that must be overcome, as well as the plugging of vessels, sap flow decreases with distance and branching. This is why crown reducing is helpful for a tree's vitality if the method reduces the number and length of branches.

Jason Gairn with his three-meter rip, the longest in a day of intentional wounding to create habitat. "We had to focus on something else than the pruning cuts we were assigned to make," he explained. "They went against all our training."

Overall crown reduction of older shade trees can be revitalizing, similar to the traditional method for fruit trees. Otherwise, overall crown reduction is seldom needed or justified.

Brittle species with sprawling forms, such as *Acer saccharinum* and *Carya illinoinensis*, are prone to heavy breakage in storms, and reduction pruning may minimize the problem. For any such "leggy" plant, first locate the tallest branch, and select a lower lateral that has room to grow. Cut, repeat with the next tallest branch, then continue until there are no tips sticking out of the crown outline. Selective reduction cuts generally work best on upward-facing limbs. Upright laterals with an angle of at least 60 degrees, no matter their size, work well as new ends to old branches. Older trees' longevity can be extended when declining limbs, even central leaders, are very gradually reduced back to concentrations of vitality

Type of Wound

The attachment to the remaining branch tells you how the tree will respond. Pruning back to a sloping branch collar with a protection zone and not painting the wound is the classic description of natural target pruning, often called "The Shigo Cut." But as Shigo said, "What are often called branches are really not branches but codominant stems." Because their attachments lack collars and protection zones, the familiar pruning model no longer applies. Protection zones do exist at secondary laterals, so for these "codoms," the Hamburg System confirms Shigo's work, and tells us to:

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Five years after construction damage, decline was slowing. Time to retrench and rejuvenate. The cut was made on the central leader of this *Quercus montana* beyond the standard location, minimizing wounding. The laterals come off at a bad angle, so "hollow elbow" instability was a concern. It was cut where its diameter narrowed, indicating resources for closure. The tree was scheduled for restoration pruning three years later, when sprouts can be thinned, and potential dieback can be removed.

- Remove small codoms following more vertical lines.
- Do not remove codoms over 5 cm (2") in vulnerable species like *Betula* and *Populus*.
- Do not remove codoms over 10 cm (4") in better compartmentalizers, like *Quercus* and *Fagus*.
- Cable or reduce larger codoms with included bark back to laterals.

Cutting back to 100 percent sound wood is always preferred, but if a damaged or decayed branch is being walled off on the inside by natural wood preservative, and on the outside by callus—"scar"—tissue, it may be a good bet to keep.

Size of Wound

The size of the wound is widely agreed to be the key to favorable tree response. Larger cuts expose defenseless older tissue, and cracks extend the infection court toward the heart of the tree. Removing large limbs to eliminate their risk of failing can, in a disturbingly short period of time, increase the risk of a catastrophic tree failure. The smaller the wound, the less it is forced to sprout, and the sooner it closes. Natural chemical compounds work to limit the decay into a cone-shaped zone, encapsulated, compartmentalized.

Intentional Wounding and "Deadwood"

Shallow cuts into sapwood just beyond a bud disrupt the downward flow of auxin from the terminal buds, potentially releasing the bud to grow into a branch. This extra wounding may benefit the tree, but some objectives drive specifications that are not tree-friendly at all. Pruning for utility clearances is one example, creating habitat for other species is another. At Fort Bragg, NC, longleaf pines are drilled with 5 cm (2") bits to favor the rare red-cockaded woodpecker. In Sweden and England, hardwood branches are torn and blasted and sliced and diced, with branch ends shaped like little crowns. The objective behind these "coronet cuts" is to invite highly specialized beetles and fungi to colonize the exposed xylem.

When tree health and safety are not the primary objectives, arboriculture gives way to vegetation management. While it may be helpful to look at trees as part of larger systems, favoring other species is very different from tree-centered arboriculture. Cultures in Europe and Asia are much older than the United States and Australia, so it's not surprising that older trees and their associates are more highly valued, and risk tolerance is higher. When extensive decay was discovered in an ancient ginkgo in front of the Kanagawa shrine in Japan, it was tethered with sisal rope. After the tree fell into the busy street, the overriding concern was to culture stump sprouts, so the tree would not die. When trees are highly valued, risk tolerance is very high.

Dead branches are traditionally removed to lessen decay moving into the tree, improve air movement and aesthetics, and lessen risk and litter nuisance, among other reasons. Deadwood may be retained if it provides benefits, such as:

- Resource translocation. Some recently dead limbs may still contain resources that are being sent downward. These life-supporting resources are a reason that some object to the term "deadwood."
- Support. Dead branches in spruces and pines, for instance, may be holding up their neighbors above. This support increases sunlight to and air flow around living branches.
- Habitat. Some valued organisms find niches in branches that are not in stems.
- Damping. Lateral branches can absorb load and improve stability.

I hope this view of pruning older trees has been of interest. A kinder, gentler approach can guide these irreplaceable trees through survival mode, retaining their contributions to your business, your clients, and your communities.

Additional Reading

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