A WORD OR TWO ABOUT GARDENING

Replacing and/or restoring damaged trees: A post-hurricane time-out.

It is normal for local garden shops to be busy at this time of year. This is a time when the weather is at its' most enjoyable and we can catch up on sprucing up the yard, especially with the abundance of annuals from which to choose. However on my recent trips I have experienced unusually long lines and what to me appeared to be more people with bags of mulch and soil as well as trees and shrubs. I took this to be signs of the ongoing attempts to recover from last year's hurricane damage to our landscapes. This is born out by the number of questions I have recently received concerning replacing damaged trees. For this article I would like to outline some of the more important issues relating to choosing, installing and subsequent care of trees. Before addressing that topic it is appropriate at this time to assess trees already in the landscape that you may be attempting to restore following last season's hurricane damage.

Most likely to recover are young trees, particularly those planted during the 12 months preceding last season's storms. Even those that completely toppled should have exhibited signs of recovery by now providing they were correctly re-set and the root ball was not allowed to dry out. More mature trees (under 20') that sustained only slight root heaving and/or damage to smaller limbs are also likely to recovery. If roots were exposed, and still remained so after the tree was braced, they should have been covered with a fast draining gritty soil mix (add coarse sand and small size aggregate). Do not mound soil over the roots to a depth of more than 1", and never around the base of the trunk.

Young trees are better able to regenerate lost roots than mature trees. At least one expert is of the opinion that if roots are broken on trees more than 12' in height and trunk diameters greater than 4", recovery will be slow. Roots of more than 3" diameter are less likely to regenerate. A tree exhibiting such damage rarely recovers its' former root function, and is at greater risk of toppling completely in future wind storms. Before next hurricane season is upon us consider the root damage sustained by any trees you are currently attempting to restore and whether they may pose a future hazard. It is not just actual storm damage that can affect recovery. Exposed broken roots should have been covered and kept moist within 48 hours of storm damage, until the tree could be righted and braced. If this was not done, roots would rapidly dry out, additionally compromising the trees' ability to regenerate an adequate root system. Don't take chances restoring a large tree that suffered anything but minor root damage, particularly if the risk involves damage to your house or a neighbor's property during a future storm. Needless to say any large mature tree that completely toppled should have been removed.

Apart from issues of whether it is possible to restore adequate root function, many trees suffered loss of foliage and extensive limb damage. As a result such trees have of necessity been severely pruned (far more so than normal practice would warrant). This severe pruning has stimulated the extensive sprouting now so in evidence on many of our local trees. For now suckers that formed around the base of the tree

and sprouting from the lower part of the trunk below the main canopy should have been removed. All growth within the tree canopy should have been retained so that the tree could renew depleted food reserves. Most of this growth will have occurred just below large pruning cuts and this should be allowed to remain for 6 – 12 months post pruning. After this time for each pruned limb remove about a third of all sprouts starting with those having weak spindly growth, cutting back another third and leaving those with the most vigorous growth uncut. The exact timing at which this first round of pruning should be undertaken will be dictated by the trees' growth rate.

As the remaining sprouts grow and become more crowded they will need to be thinned (about 10-12" apart). Retain sprouts that appear to be forming a collar at the point of attachment and/or exhibit lateral branching. In time you will need to select the sprout with the strongest growth and attachment to become the new leader (to replace the original cut limb). The sprout selected should be allowed to continue growing, cutting all others back by a third. Further pruning should be aimed at encouraging growth of the new leader by restricting growth of remaining sprouts. Remove any that appear likely to develop imperfections such as included bark crossed branches and inward growth. For a slow growing tree or one that is severely damaged this process of restoration can take several years.

If you do not feel able to carry out the above pruning protocol, retain the services of an arborist. For a large tree (one that involves climbing) hire an arborist irrespective of how confident you feel. There is no guarantee that despite expert pruning to restore the canopy, a tree will not succumb to a disease such as heart rot. The exposed surfaces that remain after removal of large limbs can serve as a portal for disease organisms. It may take several years for a disease such as heart rot to develop with little external sign except for conk like growths on the trunk. Even before these form the inside of the tree may have rotted sufficiently to render it too weak to withstand winds of less than tropical storm force. Much depends on the ability of a tree to wall off (compartmentalize) decay thereby limiting its' spread. For this reason orchid trees (bauhinias), royal poincianas (*Delonix*), coral trees (*Erythrinia*) copperpods (*Peltophorum*) and *Ficus* are more likely to succumb to decay. Conversely acacias, black olives, live oak and lysilomas are among those trees that appear better able to compartmentalize disease.

Though live oak is regarded as quite storm resistant, damage/heavy pruning to mature trees can on occasion lead to a condition known as wetwood resulting from colonization by anaerobic bacteria. As a result of bacterial fermentation, gas pressures can develop which may be sufficient to force liquid to ooze from cracks in the trunk. This is usually at a point near where a large limb broke or was removed, and the liquid can drip onto parked cars, patios and garden furniture which will be stained. It may have an unpleasant smell and on drying can turn dark brown to black. This condition in itself is usually not serious though it can indicate the likelihood of other more serious tree disease.

Another consequence of storm damage to trees are cavities, revealed when large limbs are broken and due to pre-existing decay within the tree. Contrary to previous custom, a cavity should never be filled with concrete; in fact it is better not to fill

them at all. Remove any ragged edges, but most importantly allow the surface of the cavity to dry out. Do not apply pruning sealers; once dry, these can eventually crack and allow moisture to penetrate. If the cavity contains decayed wood only remove that which is loose enough to be easily removed. Excessive scraping could well spread decay further. Cavities that collect water should be left: do not attempt to drill into the cavity to insert a drain tube as this again can spread decay. Since the fungi that cause decay require atmospheric oxygen, allowing standing water to remain in a tree cavity poses less of a risk than a film of moisture. The tree will attempt to wall off the injured area to prevent decay from spreading. A large cavity can severely compromise a tree's structural integrity and is another factor to consider when deciding on saving a damaged tree.

If you removed trees, then before even considering what to use as replacements, make a mental commitment to correctly install and maintain whatever you choose. This among other things means: corrective pruning to ensure that the tree develops good structure, then as the tree matures thinning the canopy to minimize wind resistance. This is far more important than trying to find storm resistant trees. A tree that's regarded as being storm resistant is, if poorly maintained, more likely to suffer damage than a less resistant tree that is correctly maintained. Your next consideration should be tree size not only as it pertains to the dimensions of your lot, but where in the yard you intend to install the tree. You may realize that the spot where the downed tree was located was far too close to your house or utility lines. This includes underground utilities /sewer lines which can be damaged by a falling tree as the root system becomes unearthed. A smaller tree or even a compact shrub could be a better choice. Small trees (15 – 20') are less likely to suffer wind damage during a storm and can protect a home from wind blown debris. Large trees should only be planted in large yards away from structures that could be damaged by falling limbs.

It is easier to point out trees that are at more risk of storm damage than make definitive statements as to what might survive. Be wary of fast growing trees, they often have weak limbs. Unless you have a sufficiently large yard that falling limbs will not cause damage, avoid African tulip tree, orchid trees, golden rain and copperpod. A survey in Puerto Rico after Hurricane Georges found mahogany (*Swietenia mahagoni*) to exhibit excellent resistance to snapping, toppling, canopy loss and leaf shredding. However at least one expert warns that unless it is trained to a central leader (a single main trunk), mahogany is at risk of splitting. Overall opinions as to survival are often anecdotal and for a given tree species usually fail to account for one or more of the following variables. Tree age: old trees are larger and more rigid and do not give as much compared to young trees, which are smaller and flex more but have a less developed root system. Situation: trees growing in a group are less likely to suffer damage than a solitary tree. Soil conditions: trees on shallow soil are more likely to topple than those on deeper soil, and this will be exacerbated if the soil is saturated. Add to this tree defects (e.g., circling roots, included bark), degree of maintenance plus tree health and it is clear that many extrinsic factors make direct comparisons difficult.

With the above caveats in mind, consider as medium to large shade trees live oak, tamarind (*Tamarindus indica*), sapodilla (smaller native wild dilly makes a good buffer shrub), coastal red milkwood (*Mimusops caffra*, South African tree of limited local availability), West Indian locust (suitable only for very large lots) and *Podocarpus* (non-invasive roots). If you decide a small tree is more suitable, then from the standpoint of potential damage to property, what you choose is not quite as important (a publication on small trees for Miami-Dade is available on line at: http://miami-dade.ifas.ufl.edu/publications.htm). Whatever tree you choose, pick a specimen that is graded at least Florida number 1 (Fancy is preferable). Also bear in mind that a tree of smaller trunk caliper (diameter under 2") will become established sooner, including developing a stronger root system, than the same tree having a larger sized trunk. Trees can be planted year round (avoid Nov –Feb for tender tropical species), late spring is preferable.

If you are re-planting in a place where a tree was removed, take out all of the stump and as much of the root system as possible. Decay fungi could infect the developing roots of the new tree. Plant a containerized tree as soon as possible – don't leave it for several months and risk having the tree become root-bound. If the tree appears root bound on removal from the container (circling roots) make 3-4 one inch deep slashes into the root ball. Remove any roots that could eventually girdle the trunk. The planting hole should be no deeper than the rootball and at least 2-3 times as wide. The hole should have sloping sides and you should remove any surrounding turf grass so that it will not compete with the tree's developing roots. If possible loosen the surrounding soil - on limestone this is impossible, instead dig 4-6 equally spaced trenches radiating from the edge of the planting hole. Each trench should be filled with the soil you removed plus some organic matter (e.g., Canadian peat). If you cannot replace all the rubble you removed make up the volume with a mixture of sand, Canadian peat and small aggregate such as Perma-Till. Trenching is especially important when installing large field grown trees on limestone.

Use as backfill what came out of the planting hole plus no more than about 10% Canadian peat or other organic amendment. Work some organic matter into the loosened soil surrounding the planting hole then cover with mulch to a depth of 3". The rootball must not be covered with soil and any mulch must be no more than 1" deep. When first planted irrigate to ensure that the root ball does not dry out – this could be daily in spring (when it is hot and dry), less often during cool or rainy weather and for a root pruned, field-grown tree. For small caliper trees water daily as required for 2 weeks, then every other day for a further 2 months and finally weekly until the tree is established (at least 6 months). There is no need to water the mulched area surrounding the rootball until the tree is established.

Provide a light application of a slow release fertilizer 2-3 months after the tree is planted – there is little advantage to applying fertilizer at the time of planting. Apply a slow release fertilizer once a year in spring - as the tree matures and if you fertilize surrounding shrubs and grass this can be dispensed with. Prune as required to ensure the tree develops a dominant leader, removing competing leaders and lateral branches where there is a risk of included bark. Do not remove large branches close to the trunk – cut back to reduce size and limit growth. To improve the tree's ability

to withstand windstorms growth should be thinned as required. Do not thin the interior of the tree, but remove small outer branches (on a large mature tree no more than 1-2" diameter). Removing more than 15 -20% of the total canopy risks stimulating the tree into sprouting. Finally if you miscalculated in placement/choice of a tree and it now appears the roots could become a problem, think long and hard before attempting any root pruning. Avoid cutting roots more than 1" diameter and never closer to the tree than 5x the trunk diameter. Realize that in root pruning a tree, especially a large mature tree, the tree will become less stable and at greater risk of toppling in a wind storm.

Miami-Dade needs to replace lost trees. In doing so we must make appropriate choices and correctly maintain the trees we plant.

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