
Triage and Recovery of Small Fallen Trees

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1 Monocots (e.g., bananas, coconuts) will reestablish even after losing most of their root system. One thing to look for is if the tree is snapped off below ground, which happened to several of our coconuts. Dicots can recover with as much as 95% of their absorbing roots compromised, but the real factor is the structural root system. Sometimes a major structural root breaks off near the trunk and may even take a chunk of the trunk with it. This large wound compromises the tree and that corresponding portion of the canopy will not be supplied by the root system as it should. Species differ in their susceptibility to root rot. In short, if there are no major structural roots broken back to the trunk then it is worth trying to recover the tree if it is of economic, social, or environmental value.

Hurricane Ian felled trees on ECHO's Global Demonstration farm in southwest Florida in September 2022. A fallen tree can recover if most of the roots 1 remain attached to the trunk. This article shares a step-by-step process that the staff at ECHO Florida used following Hurricane Irma and implemented after Hurricane Ian. It incorporates input shared by Dr. Jonathan Crane, Associate Center Director, Professor, and Tropical Fruit Crop Specialist at the Tropical Research and Education Center. The process could apply to other storm-affected areas and be adapted based on available materials. While this article focuses on the recovery of fallen trees, prevention is also important. Damage to trees by storms can be minimized, for

instance, by selecting and pruning trees for resilience to strong winds. This process is applicable to small fruit trees, the value of which justifies the time and effort involved.

Step 1: Gather materials that a team of two to four people can use in minimizing tree stress and righting trees.

Materials for use in minimizing stress to trees include (Figure 1):

- Water-based white latex paint
- Paint rollers, sponges, or brushes
- Mixing buckets

Materials for anchoring trees upright include (Figure 2):



Figure 1. White paint and a paint roller in a bucket.
Source: Tim Motis

2T-posts could be substituted for any good staking material that would last at least one year to give the tree a chance to reestablish its root system. Wooden stakes would work, in fact most people stake trees with wooden stakes. Anchors can be made by attaching your cabling material to a brick or log and burying it in the ground deep enough to not pull out. Wire could be replaced with any type of rope, webbing, or cable. Some factors that go into selecting the material would be how weather resistant it is, how stretchy it is, and how abrasive it would be to the trunk. If it

is not very weather resistant, you could look into treatment options such as tarring or waxing the material. If it is abrasive like metal material, put some sort of padding such as burlap, old clothing, or wood shims.

- T-posts or other sturdy material for anchoring²
- Post pounder or sledgehammer
- Ear plugs (the pounding in of posts is very loud)
- Wire (we used two-ply wire) or webbing/rope for more herbaceous and young plants
- Wire cutting tool
- Polyethylene pipe or hose (old material you don't mind cutting into short lengths)
- Pruning shears or knife to cut polyethylene pipe

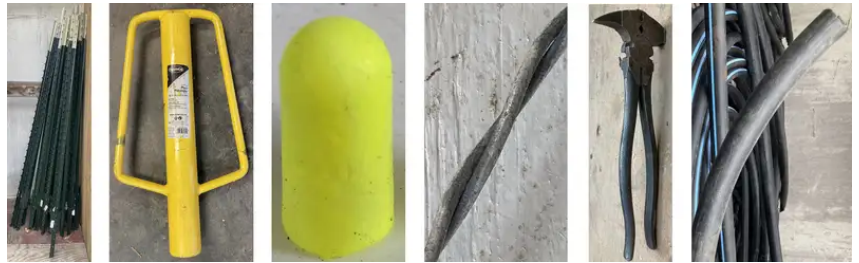


Figure 2. Tools for righting trees. From left to right: T-posts, post pounder, ear plug, wire, wire cutter, and polyethylene pipe. *Source:* Tim Motis

Step 2: Identify fallen trees that can be saved

Look for trees with intact trunks. A tree with a split trunk may be too unstable if righted. Also, look for trees with roots still attached to the trunks. If the root system is off the main trunk, there will be no way for the tree to take up water and nutrients. Lastly, look for trees that are small enough to be **safely** lifted upright by the human power and/or equipment available. Paint a unique mark or color on trees to be saved; this lets workers know which ones to focus their efforts on in terms of tree-saving.

There are several factors to consider in prioritizing which trees to right first. One factor is how many roots are out of the ground, since those will be the ones that dry out faster and die. Trees with greater percentages of roots out of the ground should have greater priority in the order of righting. The value of the tree impacts priority or righting as well. Value would be determined by the age of the tree (a producing tree has more value than a newly planted one), the accessibility of new plant material, the growth rate (a strawberry fruit [*Muntingia calabura*] tree will be easy to just replant versus the years it will take a jaboticaba [*Myrciaria cauliflora*] to start producing), the production demand, and any intrinsic values.

Step 3: Protect fallen trees from sun and moisture loss

The upper canopy of a fallen tree no longer shades the lower canopy and soil. Exposed wood is susceptible to sun damage. Unless you can upright trees immediately, protect them from heat stress as soon as possible after they fall. Use one or a combination of the following methods:

- Cover the base of trees, exposed roots, and exposed wood of major limbs with debris. Banana or palm leaves work well (Figure 3).
- Paint exposed wood with a 50/50 mix of water with white latex paint (Figure 4; Crane and Balerdi, 2006). White paint reflects sunlight, keeping painted wood from overheating.



Figure 3. A fallen tree protected from heat stress with a combination of debris (at the base) and white latex paint.

Source: Danielle Flood



Figure 4. Mixing white-wash paint. *Source:* Ashley Dawson

Step 4: Dig out soil at the base of the tree

Rainfall may wash in soil at the base of fallen trees, filling in any holes/cavities created as the trees fell. Dig out enough soil around the base of a tree so that, once the tree is upright, the roots will be at the same soil depth as before they fell.

Step 5: Water the base of the trees and consider pruning the canopy

Before uprighting trees, apply a liberal amount of water at the base of the tree. Water softens the soil and maximizes the flexibility of the roots, reducing breakage of roots while the tree is being righted. This can be done with a hose attached to a nearby spigot (Figure 5), or with water brought in via watering cans or buckets. The root to shoot ratio is important, so if a significant amount of root damage is done, it may be helpful to prune the canopy accordingly. If the canopy is not pruned back and the tree has lost a lot of feeder roots, the leaves may transpire at a rate faster than the remaining roots can take up the water which will lead to undue stress. Alternatively, if there is not a large loss of feeder roots, we do not want to cause unnecessary wounds by pruning back.



Figure 5. Water running from a hose to the base of a tree. *Source:* Tim Motis

Step 6: Right the tree

First pound in two posts at an angle away from the tree so that the stake has to pull through soil before it would pull out (Figure 6). Anticipate the direction that a tree will move as it is being righted. The arc (dotted line) shown in Figure 7A depicts this. With that direction of movement in mind, place the stakes to result in the 90 degree angle shown in Figure 7B. Metal T-posts for fencing may have tooth-like studs/nubs along one side. Pound the post with studded side facing away from the tree. This, and pounding the post in at an angle roughly perpendicular to the wire, will keep the wire from slipping upwards on the post.

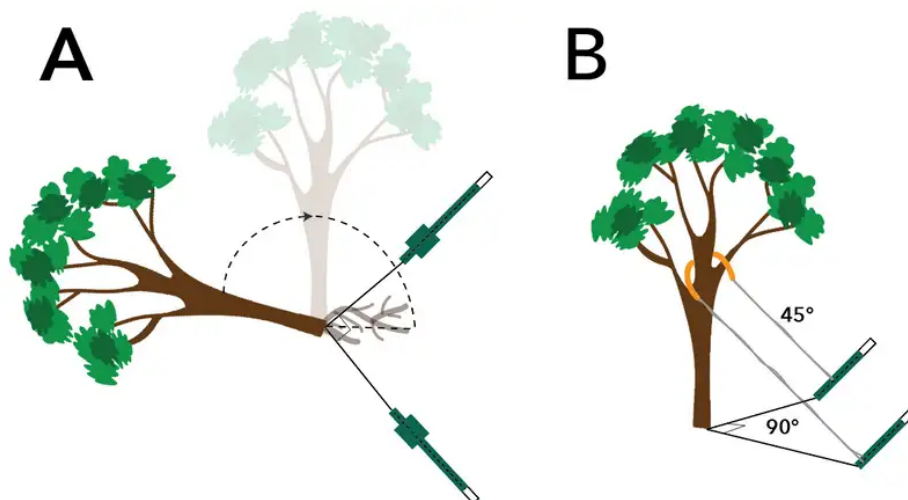


Figure 7. Angle for pounding in T-posts relative to fallen tree. *Source:* Stacy Swartz



Figure 8. Wire passed through polyethylene pipe tubing, with tubing placed around a branch. *Source:* Tim Motis

polyethylene pipe or similar tubing, you could use burlap bags.

Next, cut enough wire to anchor the tree to posts as shown in Figure 7B. Cut a section of polyethylene pipe about 30 cm long and pass the wire through the cut section of polyethylene pipe (Figure 7B and Figure 8). Place the piece of polyethylene pipe around a strong branch to keep the tubing from sliding downwards on the trunk over time. Select a branch at a height that will result in the 45° wire angle shown in Figure 7B. To minimize tension on one part of the tree, which may be necessary for larger trees, loop the polyethylene pipe around two separate branches/stems, as shown in figure 9. The polyethylene pipe keeps the wire from cutting into the bark of the tree over time. If you do not have



Figure 9. A tree with two sets of poly pipe and wire instead of one. *Source:* Tim Motis

With the wire and polyethylene pipe in place, you are now ready to right the tree. Simultaneously lift and push the tree up (Figure 10) and then secure the wire going to each post. The wire can then be tightened by twisting the two strands of wire going to each post (a rod/pipe 30-40 cm long can be placed in between the strands, half-way between the post and the polyethylene pipe, and rotated to twist the wire; Figure 11).



Figure 10. Pushing a tree upright. *Source:* Tim Motis



Figure 11. Twisting wire with rod to tighten. *Source:* Melissa Hall

Step 7: “Muck” the tree in

With the tree now upright, examine the soil at the base of the tree. Use a shovel and/or your hands to cover exposed roots, filling in air gaps/cavities with wet, muddy soil. This ensures good contact between the soil and the roots.

Concluding thoughts

After you have righted the tree and anchored it with wire, follow up with watering as needed. Take care not to overwater. Trees that have lost a lot of branches and leaves will need less water than they did formerly.

A tree may lose all its leaves from stress after falling, but can still resprout and rebound. If a tree has defoliated and still has not flushed with new growth, you can check if the twigs or stems are still green, healthy, and flexible. The timeline of how fast a tree resprouts depends on species. On our farm, the lychees resprouted in a few days while longans right next to them took a few weeks to resprout. A tree has recovered when it has flushed with healthy vegetation.

After about a year, remove the support wires and polyethylene pipe. This prevents damage to the tree that could eventually occur. It also restores the movement of trees in response to wind. Interestingly, there is evidence that movement of trees with wind results in root growth that strengthens the resilience of trees to storms (Nicoll and Ray, 1996).

Perhaps you have also learned valuable lessons about tree recovery after storms. Your comments and insights are welcome and much appreciated on this ECHO Conversation (<https://conversations.echocommunity.org/t/triage-and-recovery-of-small-trees-toppled-by-storms/5950>)!

References and Further Reading

Berkelaar, D. 2014. Strategies to help prepare for and respond to disaster (<http://edn.link/rtxmr3>). *ECHO Development Notes* no. 122.

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