

Lessons Learned:

- If the PVC spine is too thin (gauge and schedule), old (oxidized) and/or holes for the branches were not drilled straight through, the trunk may break (Figure 1). Other common failure points include snapped tree arms and frayed lines.



- Coated wire does not work well for hanging corals on trees (as the drop-line). It has a tendency to break due to metal fatigue, especially in high-energy events or storms (Figure 2). In addition, the color coating on the wire may fade quickly, making it problematic if color was used to mark genotype, bleaching or other programmatic characteristics.



- Tracking individual corals on trees can be difficult because branches don't have a distinct 'starting' end to indicate which coral is '#1' on each branch, and tagging each coral is expensive. Adding a cable tie to each branch by the spine can indicate to data collectors which side of the branch is the starting end (Figure 3). Placing cable ties on the same side of the branch in the same plane will serve as a double check if cable ties become lost. These also help with taking consistent tree photos.

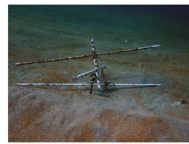


Figure 1



Figure 2

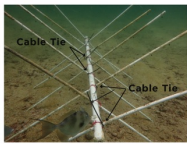


Figure 3

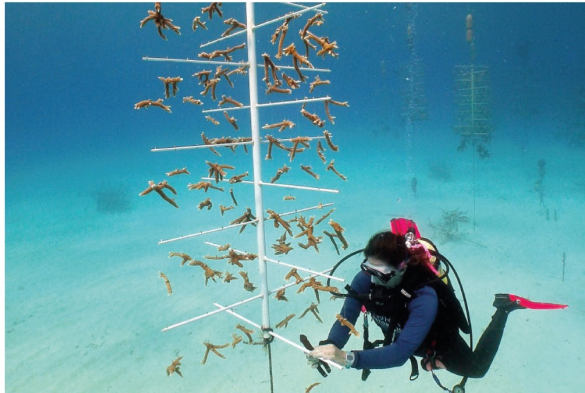
For more information: Nedimyer et al., 2011



Coral Nursery Structure Designs



Coral Tree™ (v. 1)

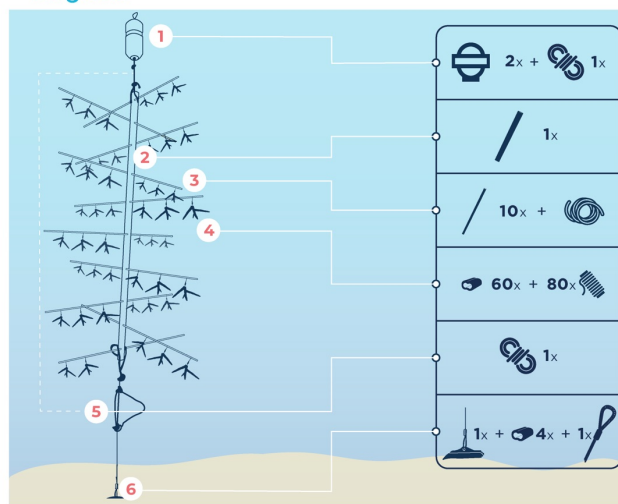


Description of the Nursery

Among floating structures, the Coral Tree™ nursery has become widely adopted as the preferred nursery method in the Caribbean where conditions are suitable. The Coral Tree™, first pioneered by Coral Restoration Foundation (Nedimyer et al., 2011), is simple, low cost, easily built and installed, and has the capacity to grow large numbers of corals within a single structure. The Coral Tree™ provides a rigid framework that allows coral to develop in the water column. Corals are attached to "tree branches" and are either hung from holes in each branch or installed on pucks secured directly to branches or on trays secured to the branches. The standard design of a tree nursery can hold 60-120 corals and allows for 360° of water circulation and movement of the tree.

The following are instructions for building a coral tree that holds 80 hanging corals, without a secondary anchor, floating approximately 1.5 m above the bottom, and at a sandy nursery site with a depth of 10 m.

Diagram:

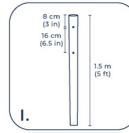


Supplies Needed:

1		Buoys - see Chapter 1: Floats/Buoys
1		Bouy Line - 1/4" double braided polyester line or 3/8" black polypropylene cut to 1.2 m
2		Trunk - Schedule 80 1" PVC - 1.5 m (5 ft)
3		Branches - Sunguard fiberglass rods in 1/2" pre-drilled, 1/2" self-drilled, or 3/8" self-drilled (Kencove Fencing)
3		Black sprinkler wire - 18 ga single strand plastic coated wire cut to 20 cm lengths
4		Hanging monofilament - 100-200 lb test cut to 20 cm lengths
4		Hanging crimps - Size G (1.3 mm) or Size F (1.5 mm)
5		Anchor Line - 1/4" double braided polyester line or 3/8" black polypropylene cut to 2.5 m lengths
6		Anchor monofilament - 3.6 mm (1000 lb. test) monofilament cut to 1.2 m
6		Anchor crimps - 3.9 mm crimps
6		Earth anchor - 1100 lb capacity, 68 duckbill anchor - see Chapter 1: Anchor Types and Anchor Lines for other options

Details of Construction and Installation:

I. Prepare the trunk. Drill the first hole at 8 cm (3 in) from the top of the trunk. The rest of the holes will be 16 cm (6.5 in) apart and perpendicular to one another, turn the trunk 90° between each hole, for a total of 10 holes.



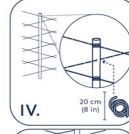
II. Prepare the branches. The fiberglass arms can be purchased pre-drilled. If using self-drilled branches, from the middle of the branch drill a 5mm hole at 2 cm, then every 5 cm until the end.



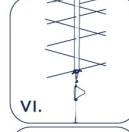
III. Prepare the anchor system. Secure one end of the anchor monofilament to the Earth anchor (duckbill) and create a loop with the opposite end using two 3.9 mm crimps on each end.



IV. Assemble the trees. Install the branches in the trunk and secure using coated wire by placing the wire through the two closest holes to the trunk and twisting the wire around the trunk to tighten. To avoid strain on the tree branches, or to save space during transit, this can also be completed in the nursery.



V. Install the anchor. Using a pointed rebar stake that easily fits inside the duckbill, pound the duckbill using a sledge hammer or post-driver to a depth where the monofilament loop is just out of the sand. Remove the rebar and pull up on the monofilament loop to turn the anchor, securing it.



VI. Attach the tree. Tie one end of the anchor line to the anchor loop and the other end around the trunk and back onto itself above the bottom branch. A slip knot can be used on the bottom so that the tree can be lowered in the water column for storm season. Anywhere that the line interacts with another surface, consider adding chafing protection.



VII. Add buoyancy. Pull the buoys down to the desired depth, by threading a line from the surface with buoys attached through the anchor loop or a weight bag to create a pulley system to the bottom. Loop the bouy line around the trunk under the top branch and tie back onto itself. Take caution to not get gear tangled in the tree as it floats.



VIII. Add corals. Create a loop with the hanging monofilament through the branch hole and secure with a crimp. Loop the other end of the monofilament tightly around the coral and secure with a crimp. The order of these two steps can be flipped.