Empirical Evidence

Riley Encased Methodology™

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The first principle of Riley Encased Methodology™ (REM 2010) is the isolation of individual propagules inside tubular encasements, which creates an artificial environment favorable to early plant development. Plants are protected from harsh environmental factors including wrack, debris, wind and wave activity, predation by macroinvertebrates and vertebrates, and unintentional damage from human interaction. The effects of phototropism and protection from ultraviolet radiation result in accelerated plant growth. Implementation of an artificial bottom enables the planting elevation to be independently established for each seedling. This capability makes possible the forced adaptation of the tree to non-native environments, such as along bulkheads and revetments where natural recruitment cannot occur.

The second principle of REM is adaptation, the spontaneous process the juvenile plant initiates when habituating to the external environment, becoming self-supportive and independent of the encasement device. Because adaptation is a self-regulated process as the tree matures through its natural stages of development, seedlings do not suffer from the shock and exposure that often results in mortality when introduced directly into severe environments that characterize high-energy and eroding shorelines. As the mangrove completes the adaptation process and habituates to the external environment, the aerial roots provide stability and nutrients to support a reproductively mature tree.

The two photos to the left show a perspective, from the water and land, of mangroves planted with Riley Encased Methodology™. This previously eroding shoreline has been stabilized by the mangroves removing any need to harden the shoreline with bulkhead or riprap. These mature trees protected the shoreline during the devastating Florida 2004 and 2005 Hurricane seasons, which included Hurricanes Jeanne, Frances and Wilma (category 2 and 3 storms). Mangroves are able to protect shorelines and embankments during severe or inclement weather events such as tropical storms and hurricanes.

The photo to the right of the new 'patent pending' encasement device shows a mangrove that has adapted to the external environment and become independent of the device. The new encasement design optimizes plant growth and the adaptation process to ensure long-term results in the most extreme environments. The encasement device is applicable in large scale reforestation as-well-as local habitat creation and ecosystem restoration projects.

In mature mangroves, it is difficult to locate any remnant of the encasement due to shoreline accretion and overgrowth by the tree. The encasement in the photo, to the left at the time of planting measured approximately 1 meter in length above the planting elevation; however, now only a few inches of the encasement extend above the resulting shoreline accretion. Another benefit of the patent pending design is the ability to remove the encasement device from the environment following completion of the adaptation process without damage to the tree.

In the above right photo, the shoreline has been stabilized and is now protected by mangroves successfully planted using REM. Mature trees also provide nursery grounds for invertebrates and fish, and habitat for birds and terrestrial animals.

In contrast to the accepted limits of mangrove reforestation and shoreline stabilization projects, which maintain that mangroves cannot be established along high-energy shorelines nor in non-native environments, Riley Encased Methodology™ has demonstrated the contraposition with the principles and processes of isolation and adaptation.