IH292 Mangrove root-tissue re-generation in Indonesia

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Mangrove habitats are very unique, extreme coastal marginal habitats. The resident flora and fauna have a wide range of extra-ordinary morphological and physiological adaptations that enable life to flourish in an otherwise inhospitable environment. The mangrove flora, halophytic angiosperms are unlike any other flowering plant. Mangrove trees have a unique and remarkable specific set of adaptations that are vital towards their survival within the dynamic marine habitat; such as aerial prop-roots, pneumataphore "breathing" roots and salt secretion glands, which enable the trees to deal with extreme fluctuations of temperature and salinity upon a daily regime. Fringing mangal within the Wakatobi such as *Rhizophora stylosa* divert energy investments from somatic growth to redirecting towards combating their stressful environment e.g. physiological adaptations such as tannins will hinder herbivory rates.

Mangrove habitats are essential towards the health of adjacent ecosystems such as sea grass beds and coral reefs; mangroves sequester and trap fine sediments within areas associated with the root systems of the floral stands. In addition, mangrove forests are also essential towards the life history of many invertebrate and vertebrate fauna such as crustaceans and fish, which can be located within the complex root systems of the trees at high tide. Thus, mangroves can be classified as crucial nursery habitats. The habitat mosaic defined by the mangrove complexity of root structures offer a safe haven for many juvenile animals. Increased complexity of roots will reduce predator-prey encounters; therefore a reduction of mangrove root complexity may have serious ecological implications towards the fauna that depend upon them.

Moreover, anthropogenic activities such as mangrove wood harvesting will exacerbate the reduction of mangrove prop-root complexity – ultimately this may facilitate an increase of fine particle sedimentation upon sea grasses and coral reefs with detrimental effects. Increased sedimentation rates may mediate potential phase-shifts that would facilitate a once hard-coral dominated reef ecosystem creating a detrimental shift for an algal dominated reef ecosystem. The detrimental impacts of algae-dominated phase-shifts have been widely reported throughout the Caribbean. Therefore, it is important to determine the factors that increase the input of mangrove prop-root detritus. Furthermore, our increased understanding of herbivory rates upon mangrove prop-roots from wood-boring organisms may offer insights towards potential marine park management strategies.

1. **<u>Brief experimental design</u>**:
   Measure the circumference and diameter of mangrove roots, then scar with changing levels of damage (*fig. 1*); treatment "A" – remove the outer bark, treatment "B" – remove the inner cortex tissues, and treatment "C" – remove the inner cambium (xylem

tissues). Then use digital analysis to monitor the change and re-measure the damaged roots over time.

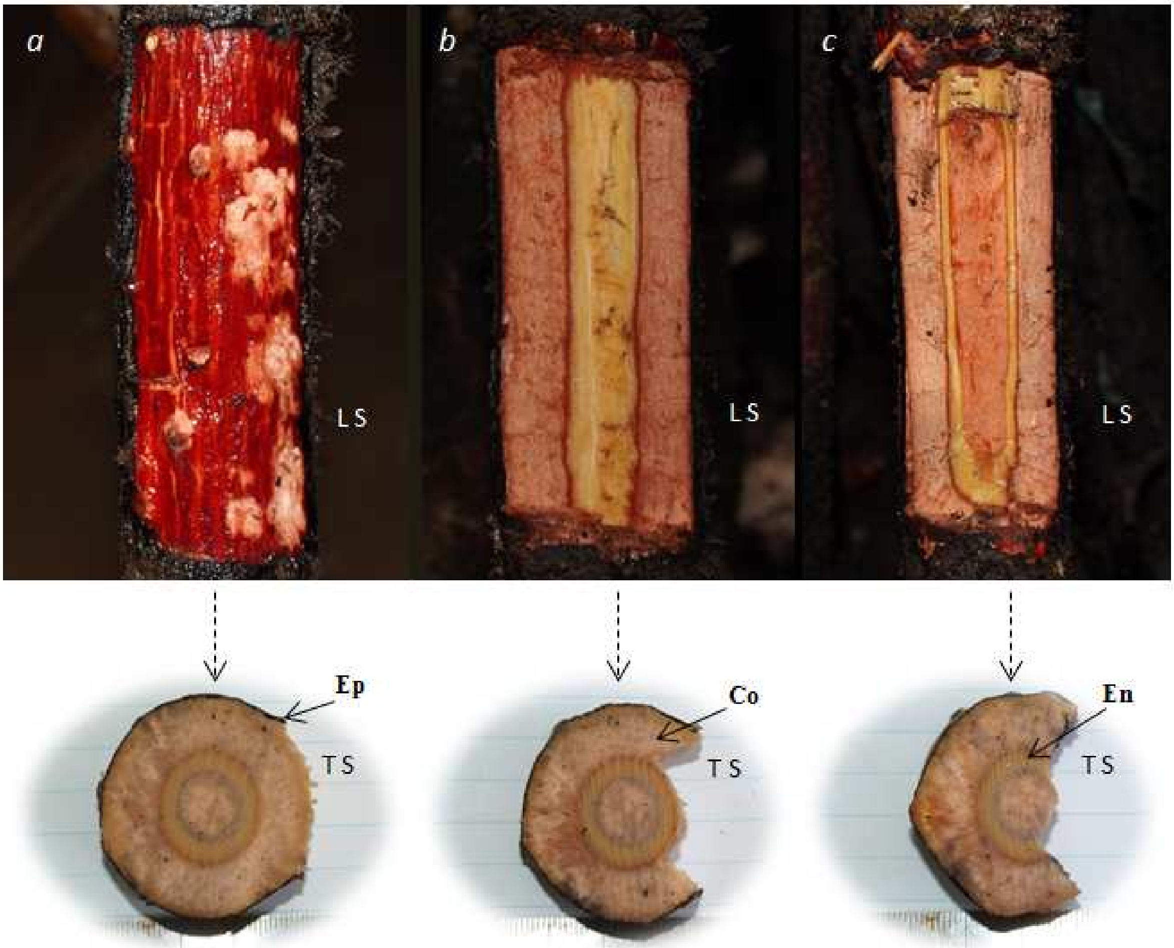

Figure. 1***.*** ***a***, illustrates the removal of the outer epiblema layer. ***b,*** removal of the carbohydrate-rich cortex tissue, exposing the epidermis layer. ***c,*** removal of the lignin-rich endodermis layer (treatment c). Ep = epiblema, Co = cortex, En = endodermis, Ls = longitudinal section and Ts = transverse section.

The analysis of root sections will highlight the resilience of mangrove tissues towards external damage and their resistance to exposure of wood-boring herbivory from teredinid bivalve molluscs.