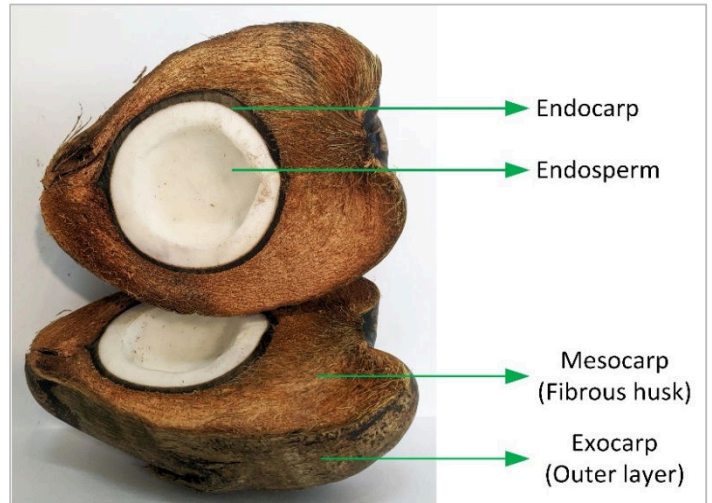
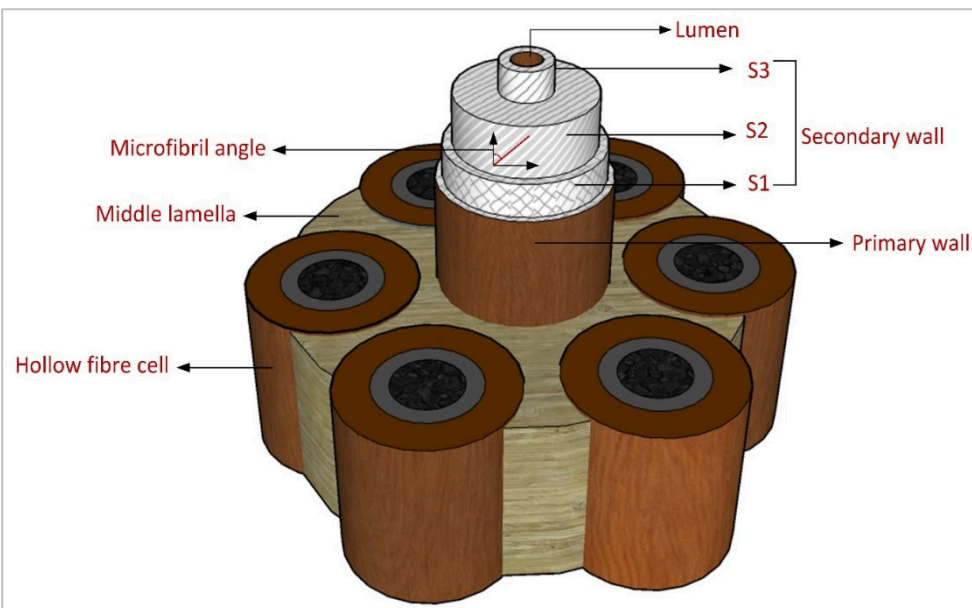


Coir Fibre Structure and Composition

Coir fibre along with the spongy coir pith constitute the mesocarp (fibrous husk) of coconut. The coir fibre has been naturally evolved into a high resilient material, as it serves the purpose of safeguarding coconut seed during falling. Longitudinal section of a matured coconut is shown in the figure.

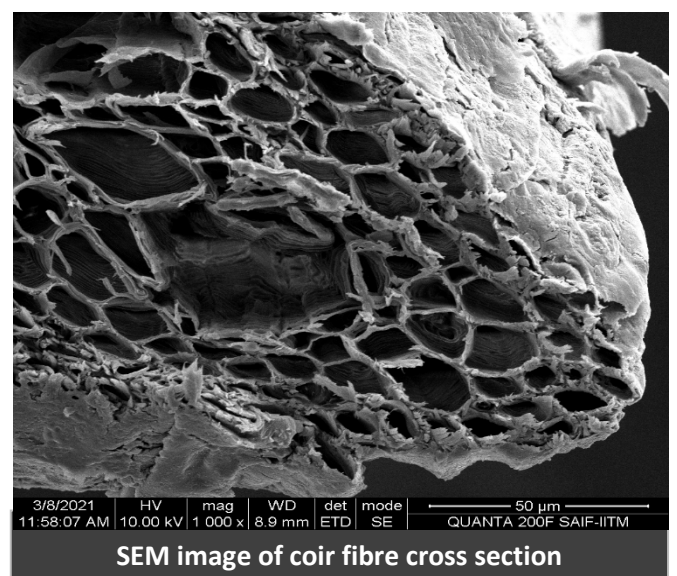


The lignocellulosic coir fibre constitute bundle of hollow fibre cells, all arranged surrounding the central opening (lacuna). Each fibre cell contains cellulose microfibrils embedded in hemicellulose and lignin. The structure of single fibre cell is shown in the figure below. It includes primary and secondary cell walls, surrounding the hollow central region, called lumen. Loose irregular network of microfibrils constitute the primary cell wall. The secondary cell wall contains three layers, S1, S2 and S3, where S2 contributes to majority of the cross sectional area. Layers between two fibre cells; middle lamella is composed of pectic polysaccharides, lignin and small amount of protein.



The cellulosic helical microfibrils of the coir fibre contains both amorphous and crystalline regions. They can be easily hydrolysed by acids. Tensile strength increases with increase in cellulose content and decrease in microfibril angle.

Hemicellulose is hydrogen bonded to cellulose and act as cementing material between the cellulosic microfibrils. Coir fibre possess the highest percentage of lignin content among the entire spectra of natural fibres. Other fibre components includes pectin and waxes, which mainly occupy the middle lamellar space. The relative percentage of individual components vary greatly depending on the geographic location as well as the maturity of the nut.



SEM image of coir fibre cross section