J Plant Physiol Pathol 2015, 2:5
http://dx.doi.org/10.4172/2329-955X.C1.003

OMICS International
conferenceseries.com SciTechnol

Global Summit on
Plant Science

September 21-23, 2015 San Antonio, USA

ZnO Nanostructure Materials For Antimicrobial and Photo catalytic Applications

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According to WHO, world is heading towards post antibiotic era means small disease and infections which have been curable from decades can kill once again. Presently, AMR (Antimicrobial Resistance) is a global threat asbacteria's are continuously evolving with new defensive mechanisms. In this direction Nano bioscience has gained increased attention for discovering the bactericidal effect of metal nanoparticles with various shapes and diameter.This is due to the novel properties of nanomaterials including small size, large specific surface to volume ratio, their close interaction and high reactivity with microbial membranes.In the present workpure and copper doped ZnO nanoparticles have been synthesized using green synthesis and mechanical assisted thermal decomposition process. The samples were characterized using TEM, UV-Vis, XRD and FTIR. The nanoparticles were tested for their antibacterial activity against Gram-positive and Gram-negative bacteria: *Staphylococcus aureus, Streptococcus progenies* and *Escherichia coli* using shake flask method.andphoto catalytic activity using methylene blue as model organic dye.The antibacterial activity of samples is attributed to four main mechanisms: oxidative stress, coordination effect, and non-homeostasis and contact killing.

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Temporal and spatial distribution of pectin, β (1-4)-galactans, xylan and lignin during differentiation of living fibre in young shoots of *Leucaena leucocephala* (Lam.) de Wit

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The distribution pattern of pectins and lignin differentiation in the cell walls of living fibers in the secondary xylem of *Leucaena leucocephala* was examined by light and electron microscopy. The expansion of primary walls during early stage of fiber development was characterized by change in the organization of pectic polysaccharides in the middle lamellae region. The intercellular regions became filled with pectic polysaccharides following initiation of SW deposition. Subsequently, lignification started at cell corners with the deposition of guaiacyl units that co-polymerize with syringyl moieties in the final stages of fiber development. The transmission electron microscopic analysis confirmed the disorganization of pectic polysaccharides in the middle lamellae region during cell expansion and it is inhomogenous distribution in the cell corners following secondary wall deposition. Immunofluorescence microscopy revealed that β-1, 4-galactans are mainly incorporated in the middle lamellae region that undergoes disorganization and reorganization during and after cell expansion. In mature fibers, LM 10 labeling indicated that the less substituted xylans are distributed throughout the SW while labeling of highly substituted xylans with LM 11 appeared more intense at corner regions of SW compared to other regions. The $KMnO_4$ staining revealed the relatively higher lignin distribution in xylem fibers in compound middle lamellae and S3 wall layers. The transition zone between S1 and S2 layers showed relatively high lignin distribution in comparison to rest of the S2 wall layer. The ultra-structural studies demonstrated that the inhomogenous distribution of lignin corresponds with that of pectins at the cell corners of fibers. The cell wall delignification resulted in significant reduction of lignin at cell corners, compound middle lamellae and secondary wall layers of fibers.

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