

Notification No: 581/2025

Date of Award: 11/06/2025

Name of Scholar: Kainat Mirza

Name of Supervisor: Prof. Meryam Sardar

Co-Supervisor: Prof. Nikhat Manzoor

Name of Department: Department of Biosciences

Topic of Research: Antifungal potential of Se-NPs and its biomedical applications

Findings

My doctoral research focused on the green synthesis of selenium nanoparticles (Se-NPs) using guava leaf extract and their evaluation for antifungal and biomedical applications. The eco-friendly synthesized Se-NPs were small, stable, and biocompatible, and showed remarkable antifungal activity against *Candida albicans*, including low MIC/MFC values, inhibition of biofilm formation, suppression of virulence factors, and disruption of fungal morphology, all with minimal host toxicity. Beyond antifungal potential, Se-NPs demonstrated significant biomedical applications: they inhibited key carbohydrate-digesting enzymes (α -amylase and α -glucosidase), enhanced glucose uptake by human red blood cells more effectively than standard drugs, and promoted rapid wound healing in vitro, confirming their antidiabetic and tissue repair potential. To extend their practical use, Se-NPs were incorporated into cotton fabric, which displayed strong antibacterial, antifungal, and antibiofilm properties, making it a promising candidate for antimicrobial textiles. Collectively, the study establishes Se-NPs as a safe, multifunctional, and eco-friendly nanomedicine with applications in managing fungal infections, diabetes, wound healing, and healthcare materials.