ABSTRACT

The present study was carried out to determine the diversity of mushrooms associated with *Pinus willichiana,* Point 3, Kumrat Valley, KP, Pakistan. 15 different mushrooms belonging to 10 different families and 10 different genera were collected during the survey and were characterized morpho-anatomically. .. In the present study 10 genera of mushrooms viz;*Russula* (Russulaceae), *Tricholoma* (Tricholomataceae), *Hebeloma* (Hymenogastraceae), *Megacollybia* (Marasmiaceae), *Armillaria* & *Floccularia* (Agaricaceae), *Suillus* (Suillaceae), *Agrocybe* (Strophariaceae), *Gymnopilus* (Stropharaceae), and *Pluteus* (Pluteaceae) were studied. FTIR spectroscopy analysis showed different functional groups and various bioactive compounds that were present in the mushroom extracts of 6 different species. The biological screening of the mushroom extracts was also carried out to determine their antioxidant, photocatalytic and antibacterial potential. From the collected mushrooms, *Russula delica* was selected for the mycosynthesis of Zinc oxide nanoparticles by sol gel method. The Zn oxide nanoparticles were also characterized through XRD, UV-vis spectroscopy, SEM and FTIR analysis and biologically screened for their various properties