

## ABSTRACT

This dissertation elucidates first comprehensive attempt on morphological and molecular phylogenetic investigation of mushrooms of district Swat, a floristically rich and diverse Hindu Kush region of Pakistan. District Swat is an area of diverse vegetation and ecosystem types. For exploring mycobiotic diversity of the area field surveys were conducted from 2012–2015 during rainy seasons for collection and documentation of mushrooms. More than 300 fruiting bodies of mushrooms were collected and preserved from the study area. Among the collected mushrooms, 100 samples were subjected to DNA analysis. Out of these 63 specimens amplified successfully during Polymerase Chain Reaction, while only 46 among the amplified ones yielded editable nuclear ribosomal ITS sequences which were subjected to morphological and molecular biosystematics studies.

Sum of 46 taxa belonging to 26 genera (15 families) are described in this work. Mushroom families like Strophariaceae and Russulaceae owe their leading positions by forming major assemblages of 6 species each in 3 genera and 1 genus, respectively. The Second largest family stands to be Inocybaceae with 5 species in 1 genus, followed by Amanitaceae, Mycenaceae and Tricholomataceae with 4 species each in 1, 2 and 4 genera respectively. Assemblages of 3 species each is revealed by Agaricaceae in 3 genera, Cortinariaceae in 1 genus and Marasmiaceae in 2 genera each. Hygrophoraceae and Boletaceae are represented by 2 species and 2 genera each, whereas, Bolbitiaceae, Hymenogastraceae, Pleurotaceae and Auriscalpiaceae are represented by 1 species each.

Out of these 2 species viz *Xerocomellus fulvus* Ahmad and Jabeen 2016 and *Inocybe kohistanensis* Jabeen and Ahmad 2016 are new to science whereas 21 species viz *Amanita aurumana* nom. prov., *Amanita longiformis* nom. prov., *Amanita superiora* nom. prov., *Cortinarius kohistanicus* nom. prov., *Gymnopus subcampanulatus* nom. prov., *Hygrocybe decoriae* nom. prov., *Inocybe Swatica* nom. prov., *Lentinellus horridus* nom. prov., *Lepiota granulata* nom. prov., *Macrocyttidia obscurum* nom. prov., *Mycena bractea* nom. prov., *Mycena lacerata* nom. prov., *Phachylepyrium kalamicum* nom. prov., *Pholiota lanceolata* nom. prov., *Pholiota manga* nom. prov. and *Pseudoomphalina conifera* nom. prov. *Russula kalamica* nom. prov., *Russula khalidii* nom. prov., *Russula pakistanica* nom. prov., *Russula russula* nom. prov. and *Xeromphalina flavens* nom. prov., seems previously undescribed.

Twenty species are new reports for Swat among which 8 species viz; *Cortinarius cistoglaucopus*, *Cortinarius elegantior*, *Gymnopus barbipes*, *Inocybe mimica*, *Lepista irina* *Leucocalocybe mongolicum* var. *perpura*, *Pholiota gummosa* and *Russula puellaris* are new records for Pakistan. Twelve species viz *Amanita flavipes*, *Boletus reticuloceps*, *Clitocybe gibba*, *Conocybe semiglobata* var. *campanulata*, *Cyclocybe erebia*, *Echinoderma asperum*, *Hebeloma theobrominum*, *Hygrophorus chrysodon*, *Inocybe rimosa*, *Leucocoprinus cretaceous*, *Pleurotus ostreatus* and *Russula sichuanensis* are already reported from Pakistan, Whereas 3 species viz *Inocybe pallida*, *Mycena pura* and *Pholiota spumosa* are already reported from Swat Pakistan.

This first attempt to explore the floristically rich area of District Swat for morphological and molecular phylogenetic assessment of Mushrooms has not only upgraded the existing

information/literature regarding the Mushrooms of Pakistan but has also established a standard bench mark for future research endeavors. The existence of 50 % species new to science in the region indicates that more concerted fungal assessment of the diverse floral region like district Swat is compulsory on urgent basis so that the rapidly growing taxonomic knowledge of fungal biodiversity could be boosted locally and globally for its application in food industry and forestry.