

Unveiling Hidden Diversity in *Aspergillus* Section *Nigri* by Indian scientists: Introducing two new species from the Western Ghats, India

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Researchers from the MACS-Agharkar Research Institute in Pune, an autonomous institute of the Department of Science & Technology, Government of India, have identified two novel species of *Aspergillus* section *Nigri* (commonly known as black aspergillus), *Aspergillus dhakephalkarii* and *Aspergillus patriciawiltshireae*, and reported the first geographic record of two black aspergilli *A. aculeatinus* and *A. brunneoviolaceus*, from soil samples collected from the Western Ghats.

The findings underscore the critical need for continued exploration and conservation of this ecologically sensitive hotspot, which holds immense scientific, ecological, and biotechnological significance.

The genus *Aspergillus* comprises a diverse group of filamentous fungi that are ubiquitously distributed across various ecological niches and are of considerable medical, industrial, and ecological significance. Although numerous *Aspergillus* species have been documented from the Western Ghats, reports specifically focusing on members of *Aspergillus* section *Nigri* remain limited, underscoring the need for further systematic exploration and taxonomic investigation using modern techniques within this section in the region.

International experts in the systematics of the family *Aspergillaceae* established stringent gold standard protocols; the *integrative or polyphasic taxonomic approach* for the authentication of the species in *Aspergillus*. Adopting these polyphasic taxonomic approach, the research team combined detailed morphological characterization with molecular phylogenetic analyses, using ITS and *CaM* (genes for identification), *BenA* and *RPB2* (genes for phylogeny). The multi-gene phylogenetic analysis was inferred through maximum likelihood analyses (with high statistical support) and the distinct lineages of the two new species were identified.

Black Aspergilli are known as workhorses of industrial application especially, in citric acid production, food mycology, fermentation technology, and agriculture. The inventory is also a part of a research thesis addressing the phosphate solubilisation potential of *Aspergillus* section *Nigri* from India. *A. dhakephalkarii* is characterized by rapid colony growth, producing pale to dark brown conidia and yellowish-white to yellowish-orange sclerotia. Its uniseriate conidiophores branch into two to three columns, and it has smooth-walled, ellipsoidal conidia, distinguishing it from related species that typically have spherical, echinulate conidia.

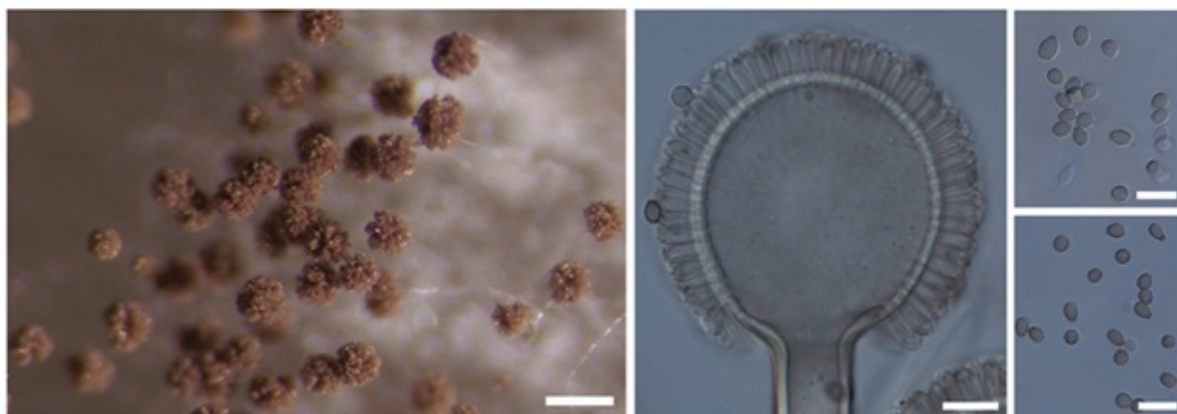


Fig 1: *Aspergillus dhakephalkarii*

A. patriciawiltshireae also exhibits fast-growing colonies with abundant sclerotia on Czapek Yeast Autolysate Agar (CYA) and Malt Extract Agar (MEA), though it shows modest sporulation. Acid production is present in CREA and produces yellowish-orange sclerotia on CYA, MEA, and OA. It features echinulate conidia and uniseriate conidiophores that branch into more than five columns.

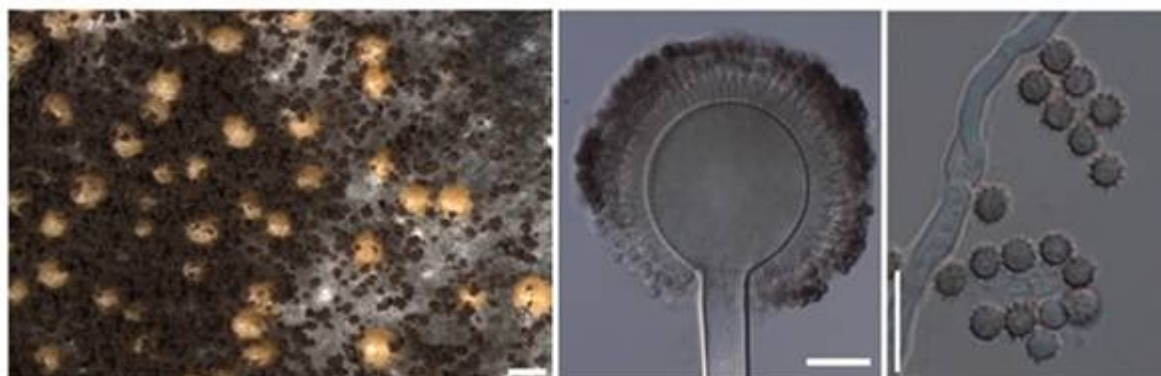


Fig 2: *Aspergillus patriciawiltshireae*

Phylogenetic analyses place *A. dhakephalkarii* as a sister species to *A. saccharolyticus*, while *A. patriciawiltshireae* is closely related to *A. indologenus*, *A. japonicus*, and *A. uvarum* in series *Japonici*. Additionally, the study reports the first records of *A. aculeatinus* and *A. brunneoviolaceus* in India.

Although previous discoveries of novel species within *Aspergillus* section *Nigri* from the Western Ghats were made by researchers abroad, this study, was originally initiated by Dr Rajesh Kumar K. C. at National Fungal Culture Collection of India, ARI, Pune as a part of an ANRF (erstwhile SERB) Project (YSS/2015/001590) and continued further with the support of MACS ARI core-funding.

The article is authored by Harikrishnan K., Rajesh Kumar K. C., and Ravindra M. Patil, is the first Indian research team to identify and describe two new species in this section. This work represents a significant advancement in the mycological understanding of the Western Ghats and underscores the region's status as a largely untapped reservoir of unique and ecologically significant fungal diversity. This is the first study of *Aspergillus* by an Indian team following most advanced integrative or polyphasic taxonomic approaches in India.

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