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Pollen and non-pollen palynomorph depositional patterns in Kaziranga National Park, India: Implications for palaeoecology and palaeoherbivory analysis

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Abstract

The main aim of this study is to produce a modern analog for pollen and non-pollen palynomorphs (NPPs) preserved in soil in relation to the different vegetation types and herbivore impact in the Kaziranga National Park (KNP). The pollen data obtained reflects both the extant vegetation types in each habitat as well as landuse, but some site-by-site variation was observed with respect to the coprophilous fungal spores present in the palynoassemblage. Canonical correspondence analysis (CCA) analysis of pollen data reveals the presence of five significantly different vegetation types, while the non-pollen palynomorphs are relatively similar in relation to the different vegetation types. The long-term association of the wildlife and their impact on different vegetation types is one of the main reasons for the variation seen in the depositional pattern in the assemblage. The openland area is one of the most important areas for wildlife in the KNP as indicated by the presence of marker pollen and coprophilous fungal spores in the palynoassemblages. Coprophilous fungal spores were most abundant in this vegetation type reflecting the higher density of herbivores. The representation of pollen and coprophilous fungal spores from the swamp samples reflected the overall composition of all vegetation types existing in the KNP. This data can be utilized as a baseline for the interpretation of paleoecological and paleoherbivory studies in other parts of the Indian subcontinent as well as its potential application at a global level.

Keywords

Coprophilous fungal spores, herbivores, palynoassemblages, pollen spectra, swamp, vegetation types

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Introduction

The study of modern pollen rain in relation to different vegetation types is a prerequisite for the interpretation of the past vegetation and climate in a region and how it has changed over time (Bent and Wright, 1963; Bunting et al., 2004; Deng et al., 2006; Gosling et al., 2009; Janssen, 1967; Overpeck et al., 1985; Prentice, 1985; Wilmshurst and McGlone, 2005; Wright, 1967; Xu et al., 2005). The study of the modern pollen rain and extant vegetation in tropical regions is more complex and critical due to high biodiversity and heterogeneity of the pollen preservation on the forest floor and nearby areas, compared to subtropical and temperate vegetation, as documented by the presence and abundance of the major pollen taxa in the pollen assemblages (Bush et al., 2021; Gosling et al., 2018; Mayle et al., 2000). Phenological factors such as the timing of the flowering period and periods of high rainfall, along with pollen production, mode of pollination, and variation in the mode of pollen dispersal influence pollen preservation both on the landscape surface and eventual integration into soils and sediments. However, based on a knowledge of the pollen spectra and how it represents the major associated plant taxa in relation to the different vegetation types, it is possible to differentiate and distinguished the different vegetation types in a region (Gaillard et al., 1994; Guimarães et al., 2017) and as well as the recognition of differences between modern and historic grassland uses (Hjelle, 1999).

There is an increasing global interest in paleoherbivory and paleodietary analysis in relation to palaeoecology during the Quaternary, particularly with respect to possible dietary changes that may have contributed to the extinction of megaherbivores (Barnosky et al., 2004; Rawlence et al., 2016). Many of these studies have been primarily based on pollen and non-pollen palynomorphs, especially changes in the relative abundance of coprophilous fungal spores, preserved in sedimentary profiles and coprolites (Burney et al., 2003; Carrión et al., 2007; Davis and

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