

The present is the key to the past – non-pollen palynomorphs (NPPs) as a proxy for herbivore impact on vegetation in the Białowieża Forest.

Present-day pollen samples provide an important and reliable research tool to improve the precision of the interpretation in vegetation reconstructions. They are commonly used to study the relationship between pollen and the surrounding vegetation, land use or climate. Pollen spectra from areas influenced by human, which are equivalent of forepassed vegetation, are so-called „modern analogues”.

The Białowieża Forest is considered to be the modern analogue for the former vegetation cover that once covered most of European lowland. This remnant of forest is distinguished by its primeval character, enormous amounts of dead wood on different stages of decomposition, mosaic of habitats and natural dynamics of forest stands. There are also some areas transformed as a result of forest management. That creates excellent conditions to collect data on non-pollen palynomorphs (NPPs) and their environmental indicative value, using modern analogues.

NPPs are present in pollen samples along with pollen and spores. They are the remains of various organisms, including many groups of fungi from different habitats. The aim of the project is to determine their composition in modern pollen samples from the Białowieża Forest to help to reconstruct the historical developments of this area. We will use moss samples, which are natural pollen traps, and Tauber-type traps – devices collecting falling pollen annually. We will analyze which environmental factors (vegetation type, landscape openness, grazing and trampling pressure, wetness, presence of dead wood) influence the abundance of this type of remains in modern pollen samples. The indicative value of many NPPs is not known yet and we will provide new information in this ground.

A very informative part of NPPs are the spores of coprophilous fungi, associated with dung of herbivores. We will determine their usefulness as the local indicators of the herbivore’s presence in the surroundings of the site. We will investigate the composition of ca. 100 moss samples, Tauber-type traps and dung of five native ungulate species in the Białowieża Forest (deer, roe-deer, bison, moose and wild boar) for the presence of this group of spores. These relationships then will constitute the baseline for the use of coprophilous fungi spores as a proxy for quantifying population density of ungulate herbivores in the past.

Finally, we will examine the degree to which pollen and NPPs from modern pollen samples can be used to predict the extent of openness in the forest as a proxy for herbivore impact. We will define pollen and NPPs indicators of canopy openness and clarify the meaning of the AP/NAP (arboreal/non arboreal pollen) ratio, which is commonly used by palaeoecologists. It may be influenced by many factors that affect the reliability of its indicative function, so an attempt to define the degree to which pollen and NPPs could be used to predict the extent of canopy openness in the condition of the Białowieża Forest would be of great value.

The resulting established relationships based on present-day NPPs will help to improve the reconstruction of the history of this area. Especially it will provide insight on how different types of herbivores might have impacted these systems in the past. Hence, the overall goal is to use present-day relationships to reconstruct historical herbivore-vegetation dynamics. This knowledge generated with this project is important as there is increasing attention for the role that large herbivores play as ‘biotic drivers’ in postglacial vegetation dynamics. Especially for forest systems there is much discussion on the degree of openness that this herbivore impact resulted in. This discussion is ongoing, mainly due to the fact that we lack a proper reference area where long-term dynamics of both natural large herbivores and the response of the tree community (without a dominant influence of human) can be studied. Our proposed study in the Białowieża Forest aims at filling this gap of knowledge. The information on past ungulate densities and dynamics could help guide management decisions in nature reserves today. The project will be based on pollen analysis including NPPs and the obtained results will form the basis for enriching knowledge about the methodological aspects of research on modern pollen rain and non-pollen palynomorphs.