

Resumption of studies on pollen deposition in the III Campus of the Jagiellonian University in Krakow

Joanna Bokalska-Rajba^{1,2}, Dorota Nalepka²

¹Doctoral Studies in Natural Sciences at the Polish Academy of Sciences in Kraków, 31-512 Kraków, Lubicz 46

²W. Szafer Institute of Botany, Polish Academy of Sciences, 31-512 Kraków, Lubicz 46

e-mail: boasia@poczta.onet.pl, D.Nalepka@botany.pl

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Abstract. Collected in 2016 samples from the surface and from the soil profiles, contained enough amounts of sporomorphs to have started studies on pollen deposition near the III Campus of the Jagiellonian University in Krakow. Preliminary results of the first year of research are presented (percentage pollen diagram and pollen accumulation rate) and compared with chosen results from previous years of research.

Keywords: pollen percentages, pollen accumulation rates, surface and soil samples, Krakow vicinity

1. Introduction

Research on pollen rain, which was conducted in 2006–2009 years, near the III Jagiellonian University Campus in Krakow (Fig. 1), was resumed in 2016. In October 2016, at the same nine sites as before, soil samples were collected, and Tauber-type traps were placed (Hicks et al. 1996; Pidek et al. 2010). Moreover, expanding the scope of the study, nine soil profiles have been collected. Samples were collected from open and wooded stands from the communities described in detail by E. Dubiel (Dubiel 2005).

The main goal of the undertaken study is to determine to what extent pollen rain reflects local and regional vegetation based on a comparison of the annual pollen rain collected in Tauber-type traps with pollen content in soil samples located in different plant communities.

The purpose of the first phase of research, started in 2016, is to compare the sporomorphs content in surface soil samples and selected soil levels.

2. Study area

Sites numbered 1, 3 and 5 are located in the open landscape. Sites numbered 1 and 3 there are meadows, partially transformed by the man, and site numbered 5 there is the xerothermic grassland. Site numbered 2, 4 and 6 are located in the artificial wooded stands; in the riparian forests (sites 2, and 4) and in the hornbeam-oak forest (Fig. 1).

3. Material and methods

Samples, with a volume of 1 cm³, were taken from the 5 cm² surface of the soil (Fig. 2a), and samples, with a volume of 1 cm³, were taken from a depth of 1–2 cm, and 5–6 cm of the soil profile (Fig. 2b). Samples were prepared using standard laboratory procedures (Faegri et al. 1989). Tablets containing indicator (*Lycopodium* spores) were added to calculate the sporomorphs concentration (Stockmarr 1971). So far, sporomorphs have been calculated on the surface of a single microscope slide (24x24mm).



Figure 1. Location of the investigated sites, numbered 1-6, in the vicinity of Jagiellonian University Campus III; satellite photo (Google Earth)



Figure 2a. Sampling for palynological studies from the surface of the soil; Photo D. Nalepka

Results are graphically presented in the POLPAL pollen diagram convention (Nalepka & Walanus 2003). Sample numbers (integers) correspond to site numbers and represent a surface samples. Decimal numbers correspond to sample numbers from subsequent depths in soil profiles.

In all, till now analysed samples, the most contemporary ones taken from the surface of the soil as well as in the lower depths sporomorphs are present (Fig. 3).

Until now, samples from sites numbered 1–6 have been analysed. These numbered as 1–3 there are samples from the surface, samples from 0–1 cm depth and samples from depths of 5–6 cm. These numbered as 4–6 there are samples from the surface, and from depths of 5–6 cm. Pollen Accumulation Rate (PAR) was counted for selected taxa from soil surface samples and for Tauber-type traps.

4. Results and discussions

Presently, the results of the previous years' study with the first three analysed sites were summarized (Table 1).

Pollen spectra from sites numbered 1 and 2 contain a slightly higher percentage of *Quercus* grains; there are oaks growing around these stands (Fig. 4).

Pollen spectra from site numbered 3 contain a higher percentage of pollen grains of trees and shrubs, although they are located in an open area.

Pollen spectra from site numbered 4 contain the highest percentage of *Pinus sylvestris* and *Populus* pollen is comparison to other sites. The poplar grows at this position.

Pollen spectra from site numbered 5 are the richest in respect of taxonomic composition. The stand is located on an open slope, in xerothermic grassland.

Pollen spectra from site numbered 6 are the poorest, and the least varied in terms of the taxonomic composition. There is a greater amount of *Acer* pollen grains from the maple trees that grow in this place.

Pollen spectra from the surface, and the depth samples from the site numbered 1–4, show little difference in terms of taxonomy composition and very small in terms of their percentage. Based on the first results of the study, started in 2017, it can be stated that the percentage of pollen grains of herbaceous plants in the majority of examined sites is greater in depth than in surface samples. Pollen spectra from the depth are more varied, richer in terms of taxonomic composition, from sites numbered 1, 3, 4 and 6.

Table 1. Pollen Accumulation Rate for selected sites and for selected taxa for the years 2006, 2008, 2009 and 2016

Sites number	Sample type	Pollen accumulation rate for selected taxa						
		<i>Pinus</i>	<i>Picea</i>	<i>Alnus</i>	<i>Salix</i>	<i>Quercus</i>	<i>Betula</i>	year
1	Soil sample 1	6640	620	600	560	680	700	2006
	Tauber – type trap 1	4243	324,3	12081	3054	11162	17378	2008
	Soil sample 2	4000	333,3	410	141	397,5	782	2009
	Tauber – type trap 2	540	51,7	373,5	655	540	683	2009
	Soil sample 3	3415,1	397	555	1827	1827	555	2016
2	Soil sample 1	2882	400	538	772	842	1034	2006
	Tauber – type trap 1	12040	979,5	10449	3142,8	4857	21632	2008
	Soil sample 3	6371	937	2998	2061	2436	1780	2016
3	Soil sample 1	7476	691,5	335	149,5	93,5	1102	2006
	Tauber – type trap 1	14737	421	11578	1157,9	842	18526	2008
	Soil sample 2	28780,5	2244	1707	243,9	195	6487	2009
	Tauber – type trap 2	2605,3	214,5	245	590	413,7	590	2009
	Soil sample 3	12688	1143	1614	493	583	1793	2016

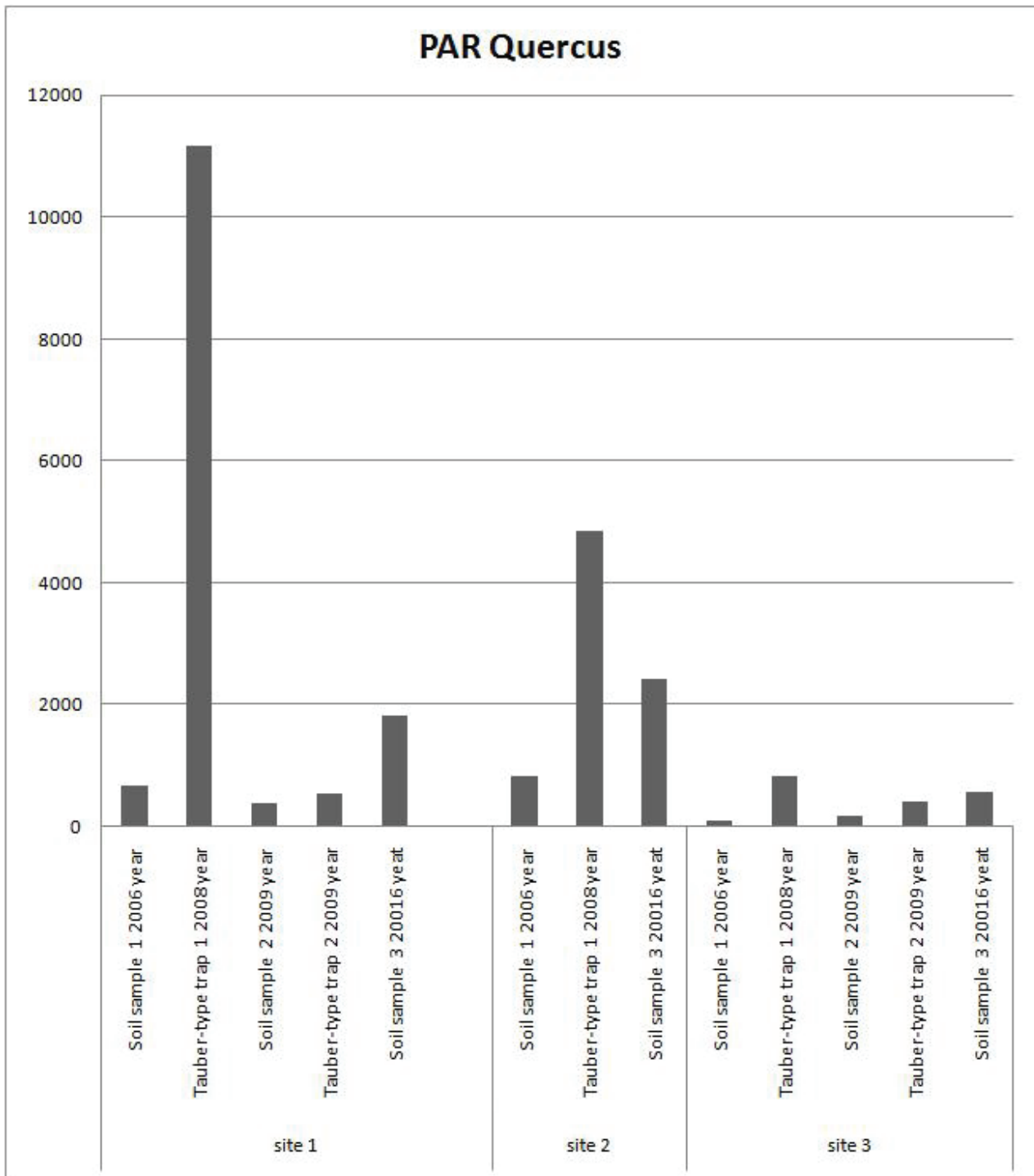


Figure 4. Pollen Accumulation Rate for *Quercus* in Soil sample 1, Tauber-type trap 1, Soil sample 2, and Soil sample 3 for the years 2006–2009 and 2016

5. Conclusions

Fluctuations in the sums of annual accumulation rate of particular taxa may be significant. The pollen content in the soil could be more erroneous. The pollen counts for traps, in relation to pollen content calculated from soil samples, show considerable differences, although not for all taxa (e. g. *Pinus* – larger differences, *Quercus*– lower differences).

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