

Alder pollen season in Poland in 2018

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Abstract: Alder pollen grains constitute the important allergen sources in this respect in the Northern Hemisphere. The aim of the study was to investigate the concentration of alder (*Alnus* spp.) in Białystok, Bydgoszcz, Cracow, Drawsko Pomorskie, Lublin, Olsztyn, Opole, Piotrków Trybunalski, Sosnowiec, Szczecin, Warsaw, Wrocław and Zielona Góra in 2018. Measurements were performed by the volumetric method (Burkard and Lanzoni pollen samplers). Seasonal Pollen Index (SPI) was estimated as the annual sum of daily average pollen concentrations. The pollen season of alder in all Polish stations began on the 11th and 13th March and the high concentration persisted until the first days of April. The highest, record airborne concentration of 1068 pollen grains/m³ was noted in Lublin on the 13th March. The peak values of seasonal pollen count occurred between of 11th March and 4th April in all cities. In 2018 pollen concentration of alder was one of the lowest in all analysed cities.

Key words: allergens, pollen count, alder (*Alnus*), 2018

Alder pollen is an early component of the annual atmospheric aerosol in Poland, which causes the first occurrence of allergic symptoms. Clinical symptoms of allergic disease are connected with the high concentration of aeroallergen [1]. Alder with birch and hazel are important sources of allergenic pollen in the temperate climatic zone of the Northern Hemisphere. The threshold value for clinical symptoms for *Alnus* pollen grains for the majority of patients is visible during exposure to the concentration of 45 pollen grains in 1 m³ of air. Symptoms were noted in all sensitized patients at the concentration of 85 grains/m³ of air [2].

Aim

The aim of the study was to analyse the alder pollen seasons in the air of Białystok, Bydgoszcz, Cracow, Drawsko Pomorskie, Lublin, Olsztyn, Opole, Piotrków Trybunalski, Sosnowiec, Szczecin, Warsaw, Wrocław and Zielona Góra in 2018.

Material and method

Measurements of airborne alder pollen were carried out in Białystok, Bydgoszcz, Cracow, Drawsko Pomorskie, Lublin, Olsztyn, Opole, Piotrków Trybunalski, Sosnowiec, Szczecin, Warsaw, Wrocław and

Zielona Gora in the year 2018. Measurements were performed by the volumetric method (Burkard and Lanzoni as the Hirst type pollen sampler). The results were expressed as the number of pollen grains in 1 m³ of air per day (P/m³). The total pollen count over this period was expressed by the symbol SPI (Seasonal Pollen Index). On the basis of literature data, the number of days with concentrations of the pollen of the *Alnus* genus exceeding the threshold values at which the consecutive allergy symptoms develop were determined (tab. 1) [2].

Results and discussion

Winter-flowering trees such as the alder (*Alnus glutinosa*) can survive periods of adverse climatic conditions, entering a period of dormancy in the early fall. The end of dormancy and the start of the pollen season require a period of low temperatures followed by

another of warm temperatures [3]. These observations also refer to data from Poland.

In 2018, the alder pollen season started between 11th and 13th March and lasted until the beginning of April. For example in 2015 the alder pollen season in most of Poland's area started 9–10th March. Also in 2015 the maximum daily concentration was observed between 8th and 13th March [4]. Similarly in 2018 in most cities of Poland the dates of maximum concentrations were noted between 12th and 15th March or 3rd April (tab. 1, fig. 1–7).

The highest daily pollen count was noted in 2018 in Lublin (1068 g/m³) (tab. 1) and the highest annual sum of alder pollen grains (SPI) was observed in Lublin, only 4790, and it was about two–three times lower than in Piotrkow Trybunalski in 2016 [5].

The highest alder pollen allergen hazard (above 45 g/m³) occurred in Sosnowiec (26 days). Pollen concentration causing severe clinical symptoms (above

Table 1. Characteristics of alder pollen season in 2018.

Features of pollen season	Bialystok	Bydgoszcz	Cracow	Drawsko Pomorskie	Lublin	Olsztyn	Opole	Piotrkow Trybunalski	Sosnowiec	Szczecin	Warsaw	Wroclaw	Zielona Gora
Seasonal Pollen Index (SPI) (total)	2867	2722	2310	3378	4790	3086	3145	3922	1536	1624	3401	4229	3548
Peak value and peak date	576 (3.04)	306 (13.03)	611 (13.03)	266 (15.03)	1068 (13.03)	546 (3.04)	436 (14.03)	534 (14.03)	184 (12.03)	124 (15.03)	432 (14.03)	907 (12.03)	546 (13.03)
Days ≥ 45 g/m ³ [5]	16	17	13	19	10	19	18	16	26	11	19	16	20
Days ≥ 85 g/m ³ [5]	8	11	8	15	5	14	9	9	16	5	13	12	11

Figure 1. Alder pollen count in Bialystok and Bydgoszcz in 2018.

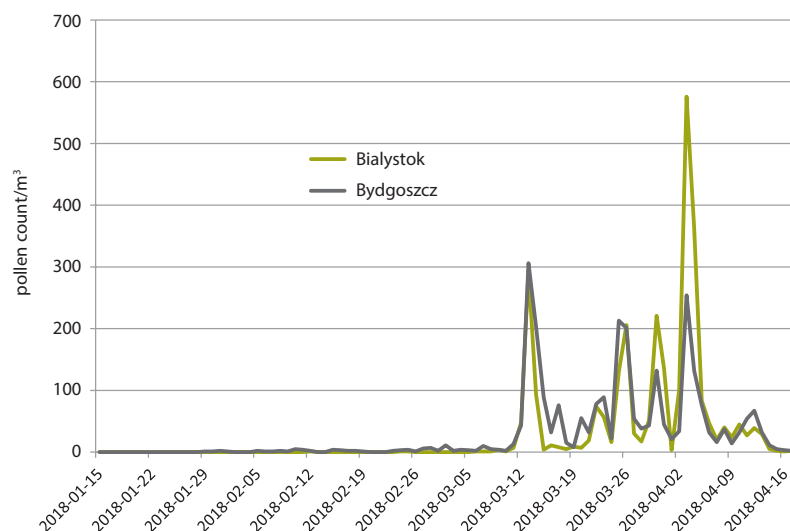


Figure 2. Alder pollen count in Cracow and Drawsko Pomorskie in 2018.

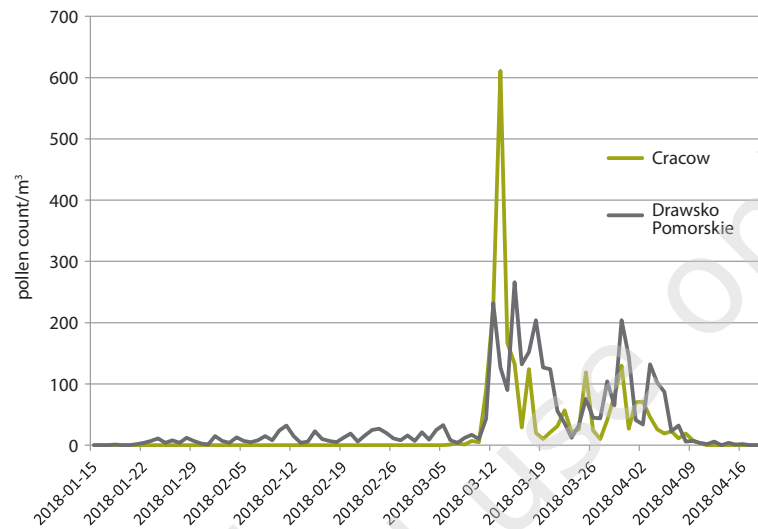


Figure 3. Alder pollen count in Sosnowiec and Lublin in 2018.

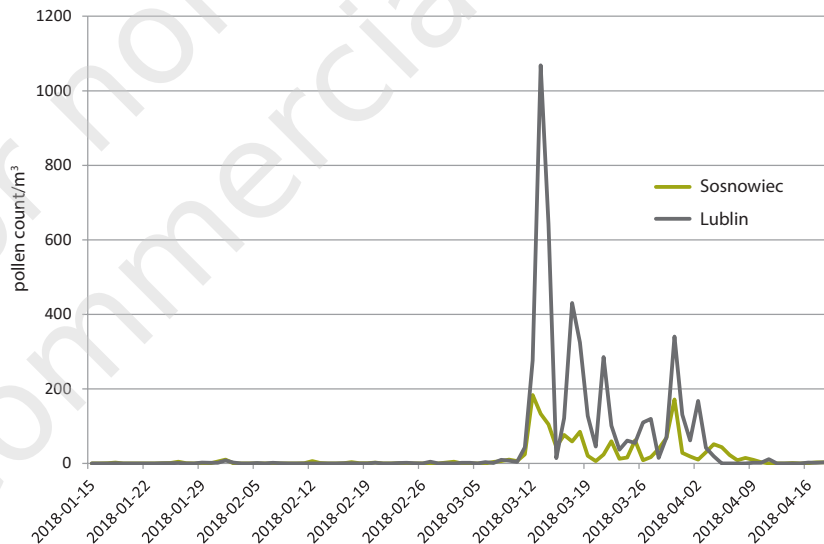


Figure 4. Alder pollen count in Olsztyn and Opole in 2018.

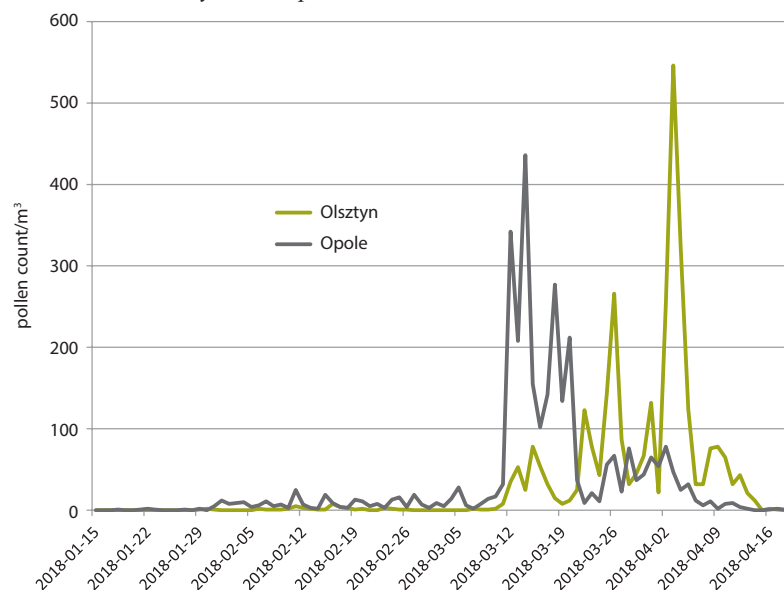


Figure 5. Alder pollen count in Piotrkow Trybunalski and Szczecin in 2018.

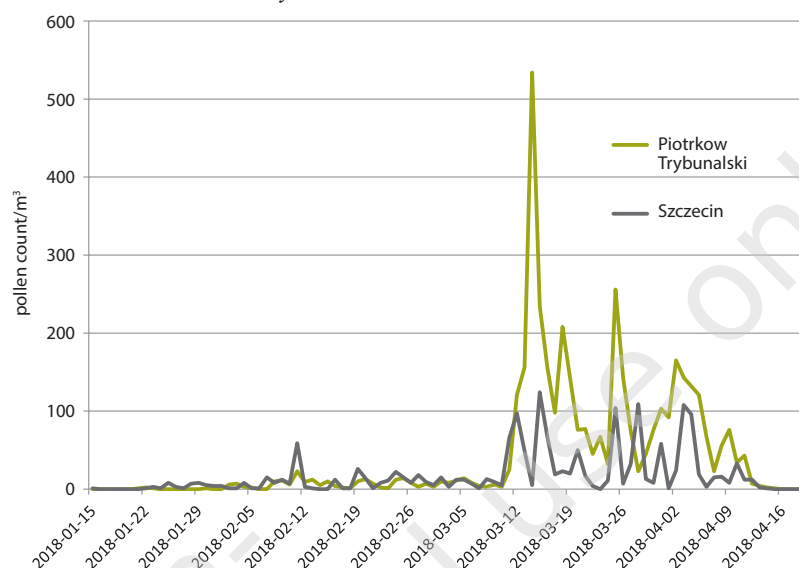


Figure 6. Alder pollen count in Warsaw in 2018.

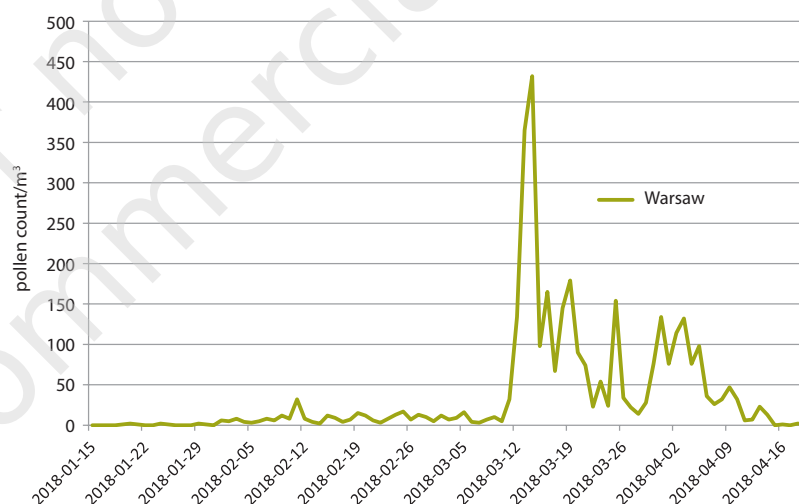
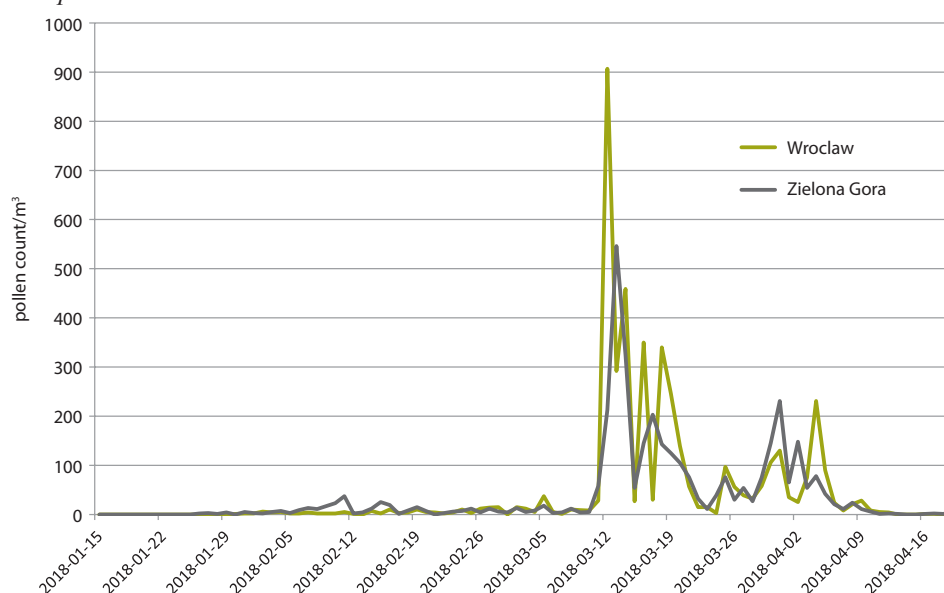


Figure 7. Alder pollen count in Wroclaw and Zielona Gora in 2018.



85 g/m³) was noted also in Sosnowiec (16 days). The comparison with alder pollen seasons in previous years revealed that in 2018 alder pollen concentrations in all cities compared in this paper were much lower than in 2016 [4]. In 2018 pollen concentration of alder was one of the lowest in all analysed cities, as in 2017 [6].

Conclusions

In 2018, the alder pollen season in all the analysed cities began in the second decade of March.

The highest concentrations of alder pollen were recorded in Lublin, whereas the lowest concentrations were noted for Szczecin and Sosnowiec.

In all the cities, the maximum concentrations of alder pollen in 2018 were recorded on a similar date (March 12–16th or 3rd April).

The greatest number of days with pollen concentrations exceeding the threshold value was recorded in Sosnowiec.

References:

1. Rodríguez-Rajo FJ, Dopazo A, Jato V. Environmental factors affecting the start of pollen season and concentrations of airborne *Alnus* pollen in two localities of Galicia (NW Spain). *Ann Agric Environ Med* 2004, 11(1): 35-44.
2. Rapiejko P, Stankiewicz W, Szczygielski K, Jurkiewicz D. Threshold pollen count necessary to evoke allergic symptoms. *Otolaryngol Pol* 2007, 61(4): 591-594.
3. González-Parrado Z, Fuertes-Rodríguez CR, Vega-Ma-ray AM et al. Chilling and heat requirements for the prediction of the beginning of the pollen season of *Alnus glutinosa* (L.) Gaertner in Ponferrada (León, Spain). *Aerobiologia* 2006, 22(1): 47-53.
4. Lipiec A, Puc M, Rapiejko P et al. Alder pollen in the air of selected Polish cities in 2015. *Alergoprofil* 2015, 11(2): 45-52.
5. Puc M, Rapiejko P, Lipiec A et al. The analysis of alder pollen season in northern Poland in 2016. *Alergoprofil* 2016, 12(2): 92-96.
6. Puc M, Lipiec A, Kotrych D et al. Alder pollen season in northern Poland in 2017. *Alergoprofil* 2017, 2(13): 77-80.

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