Alder pollen season in selected cities of Poland in 2017

Krystyna Piotrowska-Weryszko[1], Piotr Rapiejko[2], Elżbieta Weryszko-Chmielewska[3], Kazimiera Chłopek[4], Katarzyna Dąbrowska-Zapart[4], Małgorzata Malkiewicz[5], Adam Rapiejko[6,7], Agata Szymańska[8], Monika Ziemianin[9], Agnieszka Lipiec[10]

[1] Department of General Ecology, University of Life Sciences in Lublin, Poland
[2] Department of Otolaryngology with Division of Cranio-Maxillo-Facial Surgery, Military Institute of Medicine, Warsaw, Poland
[3] Department of Botany, University of Life Sciences in Lublin, Poland
[4] Faculty of Earth Sciences, University of Silesia, Sosnowiec, Poland
[5] Laboratory of Paleobotany, Department of Stratigraphical Geology, Institute of Geological Sciences, University of Wroclaw, Poland
[6] Allergen Research Center Ltd., Warsaw, Poland
[7] Oxford Archaeology Ltd., Oxford, England
[8] Laboratory of Aeropalynology, Faculty of Biology, Adam Mickiewicz University in Poznan, Poland
[9] Department of Clinical and Environmental Allergology, Jagiellonian University Medical College, Poland
[10] Department of Prevention of Environmental Hazards and Allergology, Medical University of Warsaw, Poland

Abstract: The study compares the alder pollen seasons in Zielona Gora, Poznan, Wroclaw, Opole, Sosnowiec, Cracow, Piotrkow Trybunalski, and Lublin in 2017. The investigations were conducted using the volumetric method. The alder pollen season began between 22nd and 27th February. Maximum daily pollen concentrations were noted on the same date (4–5th March) in all the cities. The greatest risk of allergies caused by the presence of airborne alder pollen was observed in Zielona Gora, Opole, and Piotrkow Trybunalski.

Key words: aeroallergens, pollen concentration, alder (*Alnus*), 2017

In Poland, *Alnus* pollen has great clinical importance and, after birch, is the most common cause of airborne allergy in the early spring. Alder pollen seasons exhibit very high variability. Differences in the onset dates in individual years can be as large as up to 2 months [1, 2]. A comparison of regional-scale analyses indicates that the earliest beginning of the alder pollen season is noted in the west of the country, while the latest onset is recorded in the east [1]. The first symptoms of allergy develop at a threshold concentration of 45 pollen grains/m^3 in a majority of highly susceptible subjects and 85 grains/m^3 in all allergic individuals [3].

Aim

The aim of the study was to compare the alder pollen season of 2017 in selected cities of Poland.

Material and method

The investigations of the airborne alder pollen concentration were conducted in Zielona Gora, Poznan, Wroclaw, Opole, Sosnowiec, Cracow, Piotrkow Trybunalski, and Lublin. Volumetric Burkard or Lanzoni devices were continuously used in all measurement stations in 2017. The results were expressed as the number of pollen grains in 1 m^3 of air per day

(P/m^3). The pollen season was determined with the 98% method. The start of the season was defined as the date when 1% of the seasonal cumulative pollen count was trapped and the end of the season when the cumulative pollen count reached 99% [4]. The number of days with a concentration equal to or greater than 45 P/m^3 and 85 P/m^3, i.e. values that may trigger hypersensitivity symptoms, were determined [3].

Results and discussion

In 2017, the alder pollen season began in the third decade of February, between 22nd and 27th, and lasted for approximately a month. The end of the season was recorded at nearly the same time in all cities, i.e. between 25th and 27th March (tab. 1; fig. 1–4). In previous years, the onset of the alder season was noted on different dates, e.g. in early February in 2016 [5] and in early March in 2015 [6].

In 2017, the maximum daily concentration of alder pollen in most cities was recorded on the same day, 5th March, with the exception of Wroclaw, where the maximum was noted a day before and Cracow, where the same very high pollen concentrations were recorded on 4th and 5th March. The highest seasonal peak was recorded in Poznan, Lublin, and Wroclaw. The lowest peak values were noted in Cracow and Sosnowiec. The lowest peak values were recorded in Cracow and Sosnowiec in other study years as well [6, 7]. In 2017, the maximum pollen concentration was noted 5–6 days earlier than in 2015 [6].

In 2017, the sums of alder pollen grains were in the range of 1399–8557; the highest sum of grains was noted in Zielona Gora and the lowest totals were recorded in Sosnowiec and Cracow. The pollen sums were 2–3-fold higher than in 2015 and lower than in 2016 [5, 6].

The highest risk of pollen allergy expressed in days with pollen levels exceeding the threshold value at which first symptoms of allergy develop (45 P/m^3) was shown for Zielona Gora (27 days). In the other cities, the risk of allergies related to the pollen levels exceeding the threshold value persisted from 9 to 23 days. The number of days with a concentration of 85 P/m^3 or higher, at which a majority of allergic subjects present with symptoms, greatly varied and ranged from 5 to 21 days. The greatest number of days with high pollen concentrations was recorded in Zielona Gora while Sosnowiec was characterised by the lowest number.

Conclusions

1. In 2017, the alder pollen season in all the analysed cities began in the third decade of February and lasted until late March.

Table 1. *Characteristics of Alnus pollen season in 2017.*

Site	Pollen season period (the 98% method)	Season duration (number of days)	Peak value (P/m^3) and peak date	Annual pollen sum	Number of days with concentration above threshold	
					45 P/m^3	85 P/m^3
Zielona Gora	22.02–26.03	33	1231 5.03	8557	27	21
Poznan	24.02–25.03	30	1685 5.03	6259	19	15
Wroclaw	23.02–26.03	32	1517 4.03	4557	15*	7*
Opole	23.02–26.03	32	1267 5.03	6958	23	20
Sosnowiec	24.02–26.03	31	266 5.03	1399	9	5
Cracow	24.02–25.03	30	245 4.03, 5.03	1593	11	6
Piotrkow Trybunalski	24.02–27.03	32	1219 5.03	4972	22	14
Lublin	27.02–27.03	29	1522 5.03	5119	19	13

** from 7th to 12th March there are no pollen data.*

Figure 1. *Alnus pollen count in Zielona Gora and Opole in 2017.*

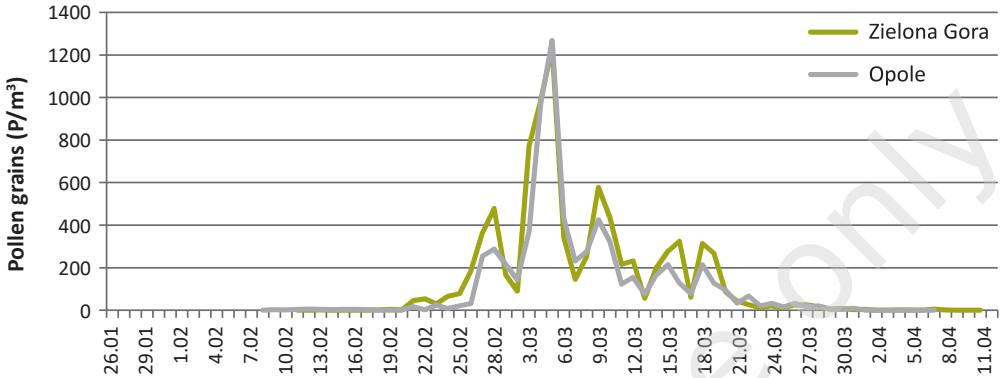


Figure 2. *Alnus pollen count in Poznan and Wroclaw in 2017.*

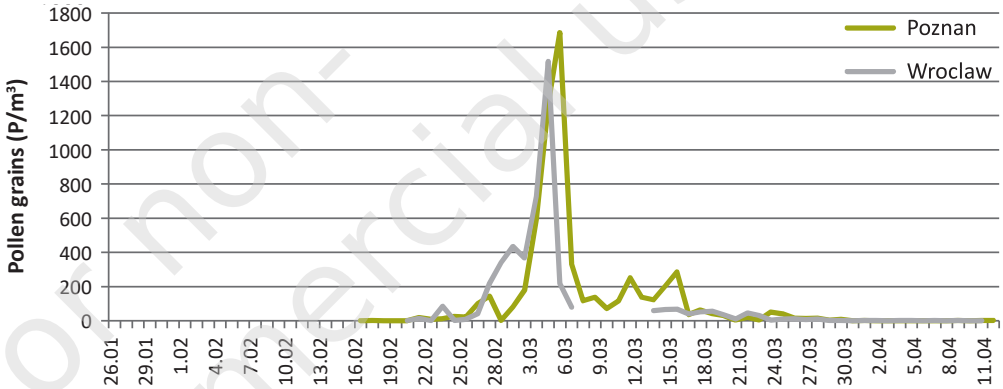


Figure 3. *Alnus pollen count in Sosnowiec and Cracow in 2017.*

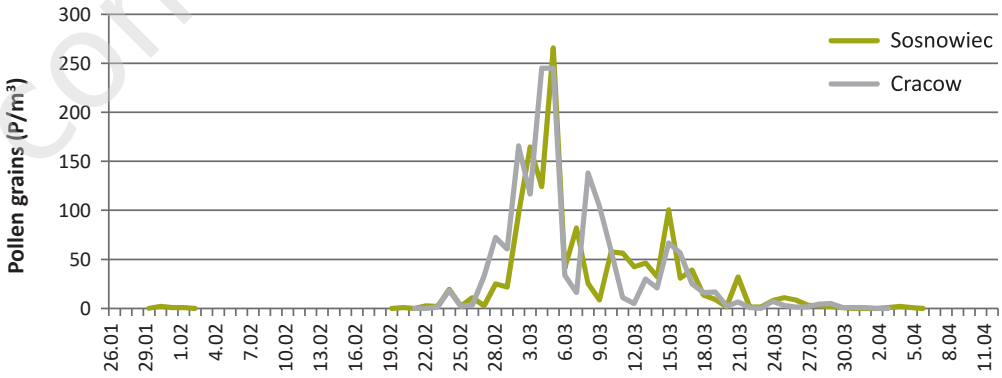
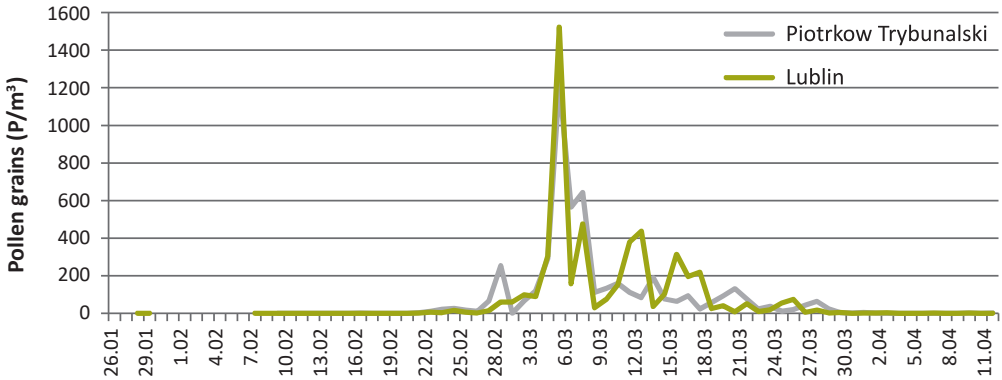


Figure 4. *Alnus pollen count in Piotrkow Trybunalski and Lublin in 2017.*



2. The highest concentrations of alder pollen were recorded in Zielona Gora, Opole, and Poznan, whereas the lowest concentrations were noted for Sosnowiec and Cracow.
3. In all the cities, the maximum concentrations of alder pollen in 2017 were recorded on a similar date (4th or 5th March)
4. The greatest number of days with pollen concentrations exceeding the threshold value was recorded in Zielona Gora, Opole, and Piotrkow Trybunalski.

References:

1. *Myszkowska D, Jenner B, Puc M et al. Spatial variations in dynamics of Alnus and Corylus pollen seasons in Poland. Aerobiologia 2010, 26: 209-221.*
2. *Piotrowska-Weryszko K. The effect of the meteorological factors on the Alnus pollen season in Lublin (Poland). Grana 2013, 52: 221-228.*
3. *Rapiejko P, Stankiewicz W, Szczygielski K, Jurkiewicz D. Threshold pollen count necessary to evoke allergic symptoms. Otolaryngol Pol 2007, 61(4): 591-594.*
4. *Emberlin J, Savage M, Woodman R. Annual variation in Betula pollen seasons in London 1961-1990. Grana 1993, 32: 359-363.*
5. *Puc M, Lipiec A, Stacewicz A et al. The analysis of alder pollen season in northern Poland in 2016. Alergoprofil 2016, 12(2): 92-95.*
6. *Lipiec A, Puc M, Rapiejko P et al. Pyłek olszy w powietrzu wybranych miast Polski w 2015 r. Alergoprofil 2015, 11(2): 45-52.*
7. *Weryszko-Chmielewska E (ed.). Pyłek roślin w aeroplanktonie różnych regionów Polski. Katedra i Zakład Farmakognozji, Wydział Farmaceutyczny Akademii Medycznej, Lublin 2006.*

Authors' contributions:
Piotrowska-Weryszko K.: 60%; and other Authors: 4.44% each.
Conflict of interest:
The authors declare that they have no competing interests.
Financial support:
Research in Opole, Piotrkow Trybunalski, Wroclaw, Zielona Gora funded by Allergen Research Center Ltd. (Ośrodek Badania Alergenów Środowiskowych Sp. z o.o.).
Ethics:
The contents presented in this paper are compatible with the rules the Declaration of Helsinki, EU directives and standardized requirements for medical journals.

Corresponding author:
Krystyna Piotrowska-Weryszko, PhD
Department of General Ecology,
University of Life Sciences in Lublin
20-950 Lublin, ul. Leszczyńskiego 58
e-mail: krystyna.piotrowska@up.lublin.pl