The analysis of hazel pollen season in southern Poland in 2017

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Abstract: This paper presents the course of hazel pollination season in southern Poland in 2017. The measurements were performed in Opole, Cracow, Lublin, Wroclaw, Sosnowiec, Zielona Gora and Piotrkow Trybunalski. Volumetric method with the use of Volumetric Spore Trap (Burkard, Lanzoni) was implemented. Pollen season was defined as the period in which 95% of the annual total catch occurred. Pollen season of hazel in 2017 started more then 20 days later in comparison to 2016. The pollen season started first in Zielona Gora. The highest daily pollen count was recorded in Lublin on 5th March (471 P/m^3).

Key words: aeroallergens, pollen count, hazel (*Corylus*), 2017

Hazel is an early flowering tree. The onset of hazel flowering period highly depends on atmospheric conditions, especially on cumulative air temperature. The intensity of pollination and the overall number of pollen grains produced by the plant depend on weather conditions during the pollination period and a period immediately preceding pollination, as well as on the conditions prevailing during late summer of a previous year.

Hazel pollen, next to alder and birch pollen, is a very common cause of pollinosis in Central and Northern Europe [6]. It is present in the air already at the turn of winter and spring, and one hazel inflorescence can produce up to 3,680,000 pollen grains [3].

The onset and peak of the hazel pollination period show a significant variability. Depending on weather conditions, the duration of the hazel pollination period can vary by 30–45 days in individual years.

The threshold concentration of hazel pollen in Poland is 35 grains/m^3 of air [2, 4]. With the concentration of 80 grains/m^3 of air, all individuals allergic to hazel pollen suffer from pollinosis.

Aim

The aim of the study was to compare the hazel pollen concentration in the air of in selected cities in southern Poland: Wroclaw, Cracow, Lublin, Opole,

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Sosnowiec, Zielona Gora and Piotrkow Trybunalski in 2017.

Material and method

In 2017, the measurements of the pollen concentration in the study sites were performed with the volumetric method using Burkard and Lanzoni pollen samplers. Microscopic observations were performed on preparations obtained in a 7-day cycle with assessment of 24-hour periods. The length of the hazel pollen seasons was determined with the 95% method. Pollen concentrations were expressed as the number of pollen grains in 1 m^3 of air per day (P/m^3). The course of the pollen seasons in each city is shown in the graphs (fig. 1–7).

Results and discussion

In 2017, the first grains of hazel pollen were recorded in Lublin in the first half of January, and in Sosnowiec at the end of January. However, the period of consistent pollination, determined using the 95% method, started in the second half of February (tab. 1), and was delayed in comparison to 2016 by more than 20 days [1]. The dates of the hazel pollination period onset in the analysed cities in Southern Poland in 2017 were very similar. The earliest onset of the hazel pollination period was recorded in Zielona Gora – 19th February, and Opole – 21st February (tab. 1). In Wroclaw and in Piotrkow Trybunalski – 23rd February, and in Sosnowiec and Cracow – 24th February (tab. 1). The latest onset of the hazel pollination period was recorded in Lublin – 27th February.

The highest hazel pollen concentrations were detected in the first decade of March (3–5 March) in a majority of the analysed cities and on 28th February in Cracow. The highest daily pollen count was recorded in Lublin – 471 P/m^3. In other cities the maximum concentrations ranged from 103 P/m^3 in Cracow to 154 P/m^3 in Piotrkow Trybunalski (3.04) (fig. 5–7). The lowest daily hazel pollen concentration were noted in Zielona Gora – 76 P/m^3 and Sosnowiec – 77 P/m^3 (fig. 1, 4).

The highest annual pollen sum of hazel pollen grains (SPI) were recorded in Lublin and Opole: 1411, 960, respectively. They were similarly high in Piotrkow Trybunalski and Zielona Gora. In other cities SPI ranged between 440 in Sosnowiec to 552 in Cracow (tab. 1). The SPI of *Corylus* pollen in 2017 was close to that registered in previous years [1, 5].

The highest hazel pollen allergens hazard occurred (above 35 P/m^3) [2, 4] in Opole and Lublin (10 days), while the lowest pollen allergens were noted in Sosnowiec and Cracow (6 days). A pollen concentration causing severe clinical symptoms (above 80 P/m^3) [2, 4] was detected in Opole and Wroclaw (3 days).

Conclusions

The hazel pollination period in 2017 started about 20 days later compared to 2016 [1]. Such a late onset of the hazel pollination period in 2017 was a result of long-lasting unfavourable weather conditions, especially low temperature and persistent snow cover. Hazel pollen season in most cities was more than 25 days long. The start of hazel pollen season in 2017 occurred in the third decade of February. The maximum concentrations of hazel pollen in majority of the cities were noted in beginning of March (3–5 March), only in Cracow on the end of February (28th February). The annual pollen sums in 2017 were lower than those in the previous year.

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

Site	Zielona Gora	Opole	Wroclaw	Sosnowiec	Piotrkow Trybunalski	Cracow	Lublin
Pollen season period by the 95% method	19.02–17.03	21.02–18.03	23.02–17.03	24.02–23.03	23.02–22.03	24.02–18.03	27.02–22.03
Maximum pollen count (P/m^3) (date)	76 (5.03)	138 (5.03)	135 (4.03)	77 (3.03)	154 (5.03)	103 (28.02)	471 (5.03)
Seasonal Pollen Index – SPI (total)	707	960	636	440	820	551	1411
Days number above threshold 35 P/m^3	8	10	7	6	8	6	10
Days number above threshold 80 P/m^3	0	3	3	0	2	2	2

Figure 1. *Hazel pollen count in Zielona Gora in 2017.*

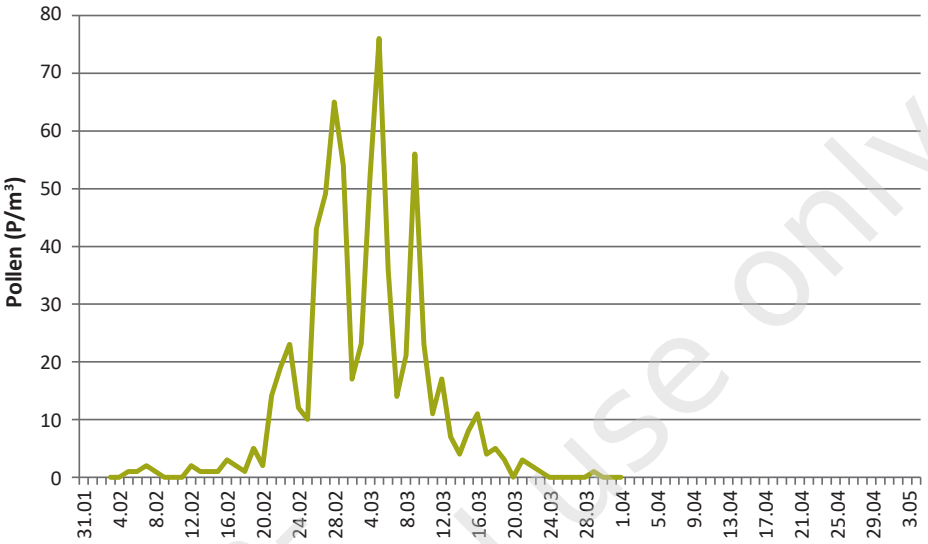


Figure 2. *Hazel pollen count in Opole in 2017.*

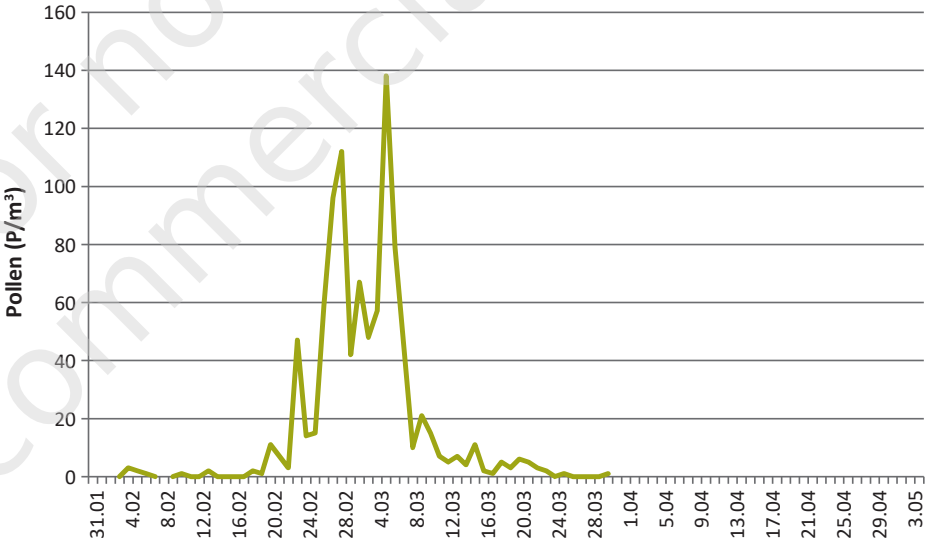


Figure 3. *Hazel pollen count in Wroclaw in 2017.*

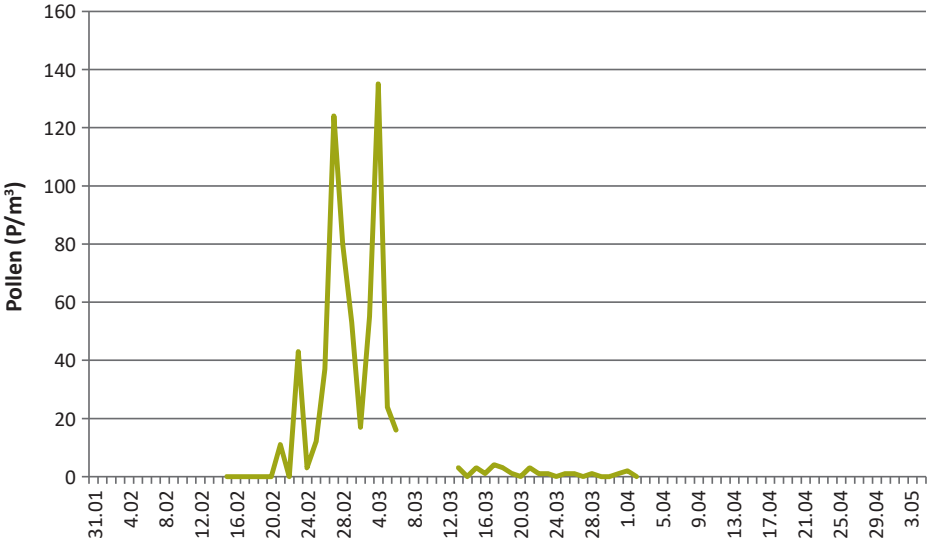


Figure 4. *Hazel pollen count in Sosnowiec in 2017.*

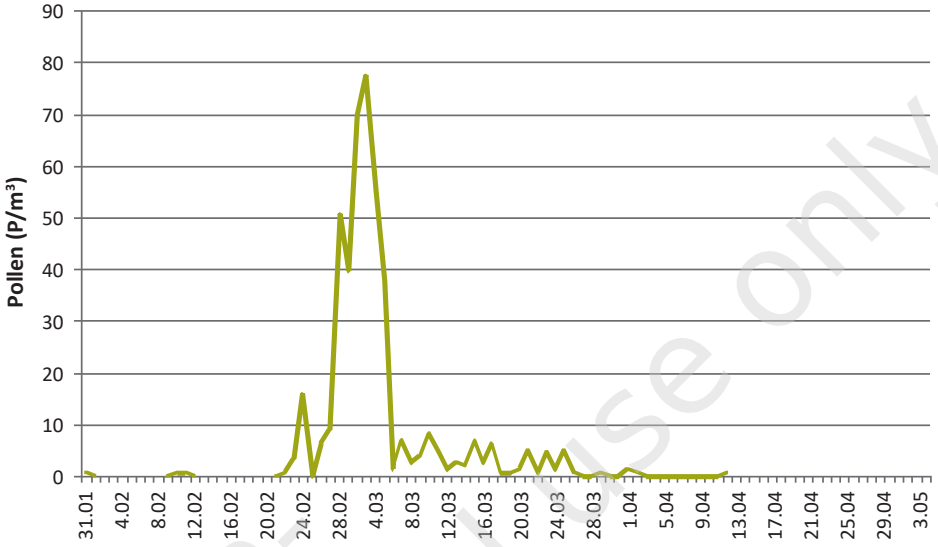


Figure 5. *Hazel pollen count in Piotrkow Trybunalski in 2017.*

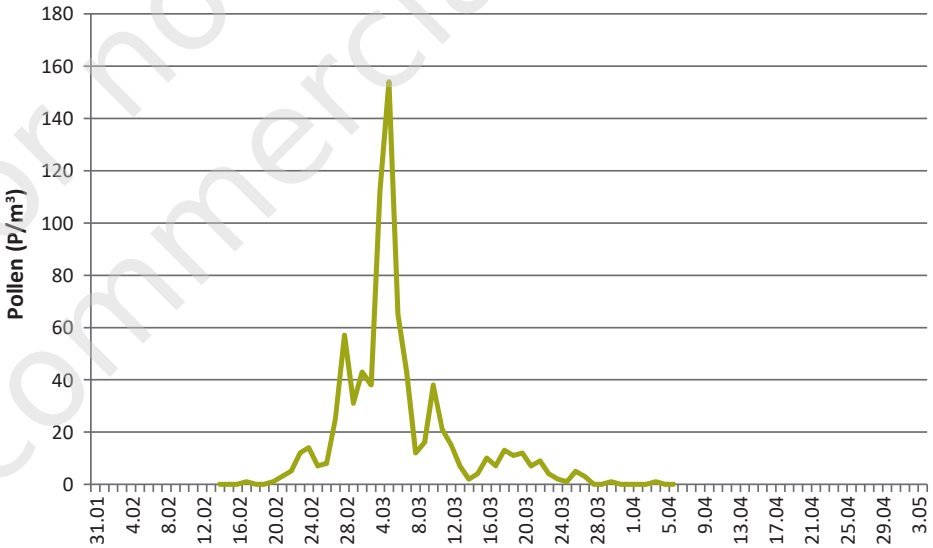


Figure 6. *Hazel pollen count in Cracow in 2017.*

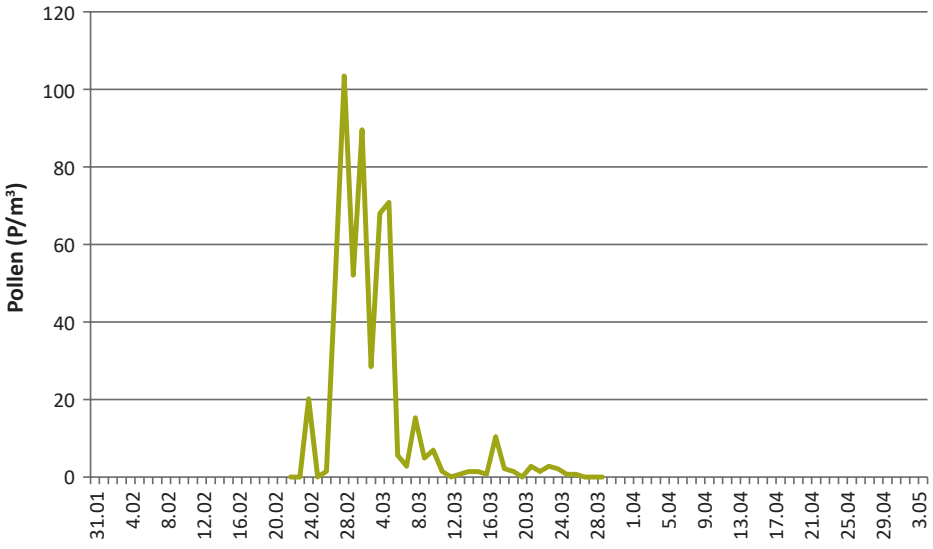
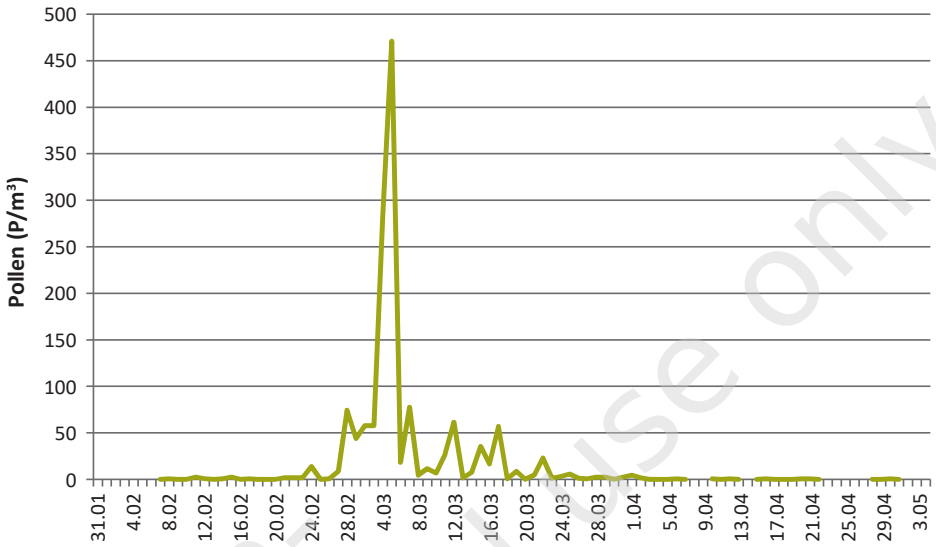


Figure 7. *Hazel pollen count in Lublin in 2017.*



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Authors' contributions:
Malkiewicz M: 60%; Piotrowska-Weryszko K: 5%; Chłopek K: 5%; Dąbrowska-Zapart K: 5%; Weryszko-Chmielewska E: 5%; Ziemianin M: 5%; Rapiejko P: 5%; Rapiejko A: 5%; Lipiec A: 5%.
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The authors declare that they have no competing interests.
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Ethics:
The contents presented in this paper are compatible with the rules the Declaration of Helsinki, EU directives and standardized requirements for medical journals.

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