

# Ragweed pollen season in southern Poland in 2016

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**Abstract:** The paper presents a comparison of ragweed pollen seasons in Zielona Gora, Opole, Wrocław, Sosnowiec, Cracow, and Lublin. The investigations were carried out with the volumetric method. The ragweed pollen season began on different days of August. The maximum daily pollen count in all the cities was noted at the end of August. The greatest risk of allergies caused by the presence of airborne ragweed pollen was reported from Zielona Gora, Opole, and Sosnowiec.

**Key words:** aeroallergens, pollen concentration, ragweed (*Ambrosia*), 2016

In many European countries, *Ambrosia* is regarded as an invasive plant [1]. In Poland, however, the species is not included by the Regulation of the Minister of the Environment of 9 September 2011 (Journal of Laws no. 210) in the list of alien animal and plant species that can threaten native species or natural habitats when released into the natural environment. Yet, in 1996, the plant was recommended for mandatory eradication procedures due to its harmless effects. Still, ragweed pollen contains the strongest allergens known in the plant world and poses a real threat to allergic subjects [2].

## Aim

The aim of the study was to analyse the ragweed pollen season of 2016 in selected cities of southern Poland.

## Material and method

The investigations of the airborne ragweed pollen concentration were conducted in Zielona Gora, Opole, Wrocław, Sosnowiec, Cracow, and Lublin. Volumetric Burkard or Lanzoni samplers were continuously used in all measurement stations in 2016. The daily pollen counts were determined. The results were expressed as the number of pollen grains in 1 m<sup>3</sup> of air per day (P/m<sup>3</sup>). The length of the ragweed pollen seasons was determined with the 98% method. The number of days with a concentration equal to or greater than 5 P/m<sup>3</sup> and 20 P/m<sup>3</sup>, i.e. values that may trigger hypersensitivity symptoms, as suggested by various authors, were determined [1, 3, 4].

## Results and discussion

In 2016, the earliest records of ragweed pollen were reported from Lublin (7.08) and the latest from

Wrocław (20.08). In previous years, the first pollen grains of this taxon usually appeared earlier, i.e. at the end of July or at the beginning of August [5, 6]. In Wrocław, the ragweed pollen season was the shortest and finished on 11.09; in turn, the end of the season in the other cities was recorded in the second half of September or at the beginning of October (tab. 1).

The maximum daily concentration of ragweed pollen was noted on the same day, i.e. 27.08, in four cities (Zielona Góra, Opole, Wrocław, and Sosnowiec), whereas in Cracow and Lublin, it was recorded two days later on 29.08. The highest seasonal maxima were in the range of 71–15 P/m<sup>3</sup>, with the highest value noted in Zielona Góra and the lowest in Cracow. In all the cities, relatively high concentrations of airborne pollen were observed on 27–29.08 and 8–9.09 (fig. 1–6). In 2016, the maximum pollen concentration was noted 8–14 days earlier than in 2014 [5].

Ragweed pollen seasons are often characterised by discontinuity; on some days, no airborne pollen is recorded [7]. Therefore, the study was focused on comparison of the length of the pollen season with the number of days on which pollen grains of this taxon were observed. This analysis reveals that the lowest number of days with a ragweed pollen concentration of at least 1 P/m<sup>3</sup> was noted in Lublin; ragweed pollen was not recorded during at least half of the period referred to as the pollen season. Similarly, ragweed pollen was not detected on many days (17) of the season in Sosnowiec. The highest number of days with detected airborne ragweed pollen was reported from Zielona Góra and Opole (tab. 1).

In 2016, the highest annual total of ragweed pollen grains was reported from Zielona Góra and Opole, i.e. 371 and 369 grains, respectively; in turn, the total count exhibited the lowest value, i.e. 83, in Lublin. In the other cities, these values were in the range of 115–277 pollen grains. Substantially lower counts of pollen were recorded in Lublin and Cracow in 2016, compared with previous years. The total annual count in Lublin was almost 5-fold lower than the mean from 2001–2013. In turn, this value was 1,6-fold lower in Cracow. No such differences were noted in the other cities [6].

The greatest risk of allergy associated with exceeding the threshold value at which symptoms allergy develop (5 P/m<sup>3</sup>) was indicated for Opole and Zielona Góra. High concentrations (above 20 P/m<sup>3</sup>) triggering symptoms in a majority of allergic subjects were noted in all the cities except for Cracow, with the highest frequency in Opole and Sosnowiec (6 days) and in Zielona Góra (5 days).

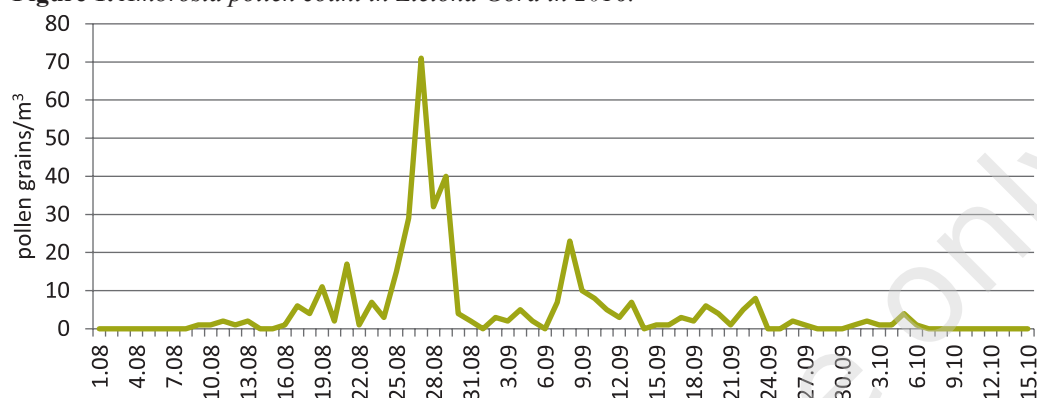
## Conclusions

1. Compared with previous years, the ragweed pollen seasons in 2016 began later, but the maximum concentrations were noted at an earlier time.
2. In all the cities, the maximum ragweed pollen concentration in 2016 was recorded at the end of August.
3. The greatest risk of development of pollen allergy symptoms triggered by pollen counts exceeding the threshold value was noted in Zielona Góra, Opole, and Sosnowiec.

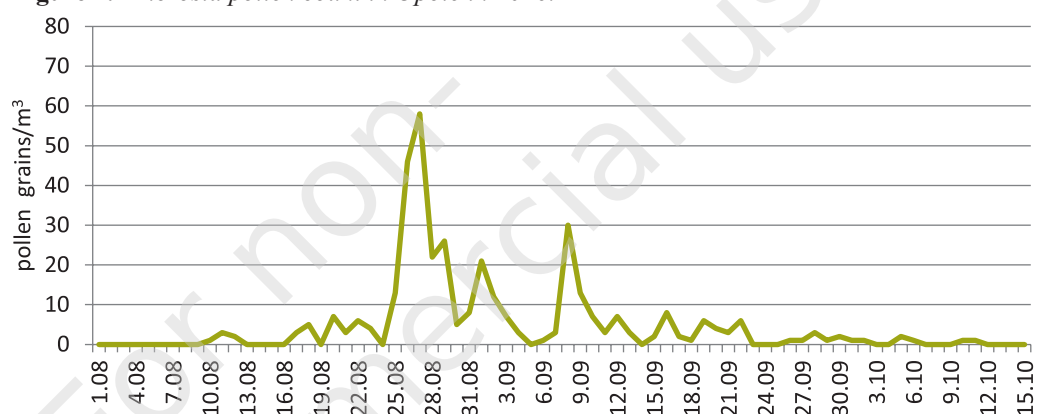
**Table 1.** Characteristics of *Ambrosia* pollen season in 2016.

Site	Pollen season period by the 98% method	Season duration/number of days with concentration above zero	Peak value (P/m <sup>3</sup> ) peak date	Annual pollen sum	Number of days with concentration above threshold	
					5 P/m <sup>3</sup>	20 P/m <sup>3</sup>
Zielona Góra	11.08–5.10	56/49	71 27.08	371	19	5
Opole	11.08–5.10	56/47	58 27.08	369	20	6
Wrocław	20.08–11.09	23/21	69 27.08	200	6	3
Sosnowiec	9.08–29.09	52/35	51 27.08	277	12	6
Cracow	18.08–18.09	32/24	15 29.08	115	10	0
Lublin	7.08–18.09	43/19	25 29.08	83	4	1

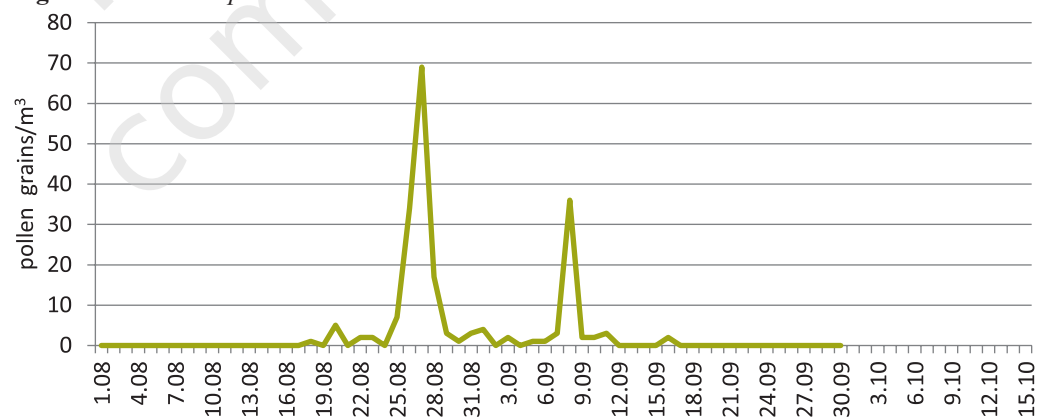
**Figure 1.** *Ambrosia* pollen count in Zielona Gora in 2016.



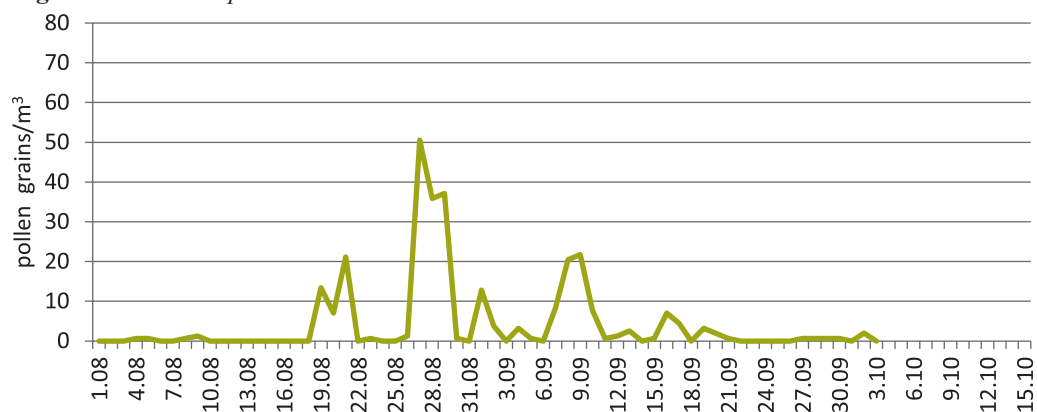
**Figure 2.** *Ambrosia* pollen count in Opole in 2016.



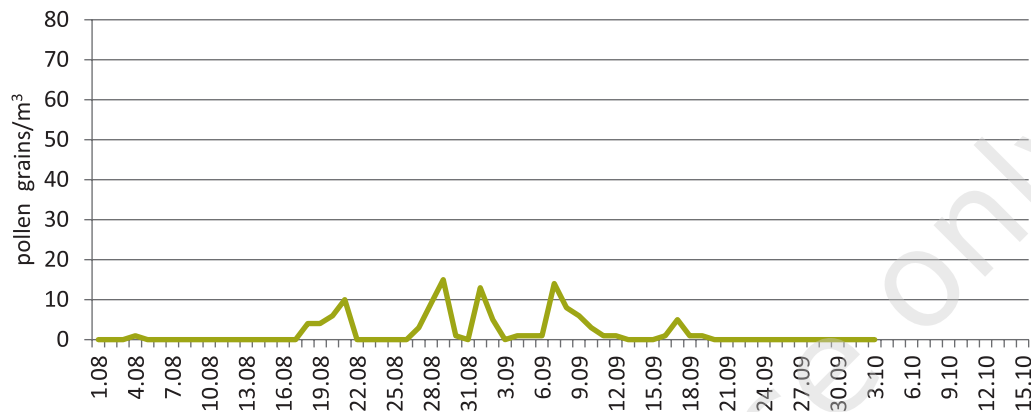
**Figure 3.** *Ambrosia* pollen count in Wroclaw in 2016.



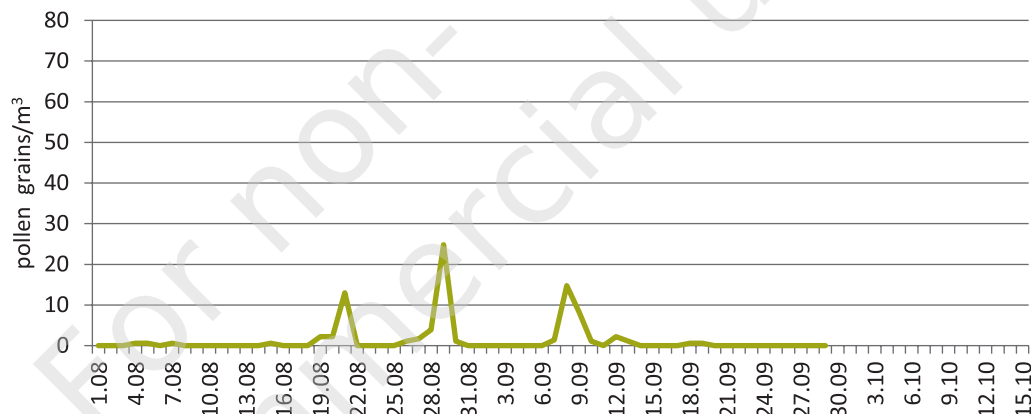
**Figure 4.** *Ambrosia* pollen count in Sosnowiec in 2016.



**Figure 5.** *Ambrosia* pollen count in Cracow in 2016.



**Figure 6.** *Ambrosia* pollen count in Lublin in 2016.



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## Authors' contributions:

Piotrowska-Weryszko K: 50%; Weryszko-Chmielewska E: 10%; Lipiec A: 5%; Rapiejko P: 5%; Chłopek K: 5%; Chloupek A: 5%; Dąbrowska-Zapart K: 5%; Małkiewicz M: 5%; Ziemiński M: 5%; Sadowska D: 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 of the Declaration of Helsinki, EU directives and standardized requirements for medical journals.

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