Alternaria spores in the air of selected Polish cities in 2020

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Abstract:

The study compares the course of the spore season of *Alternaria* in Bialystok, Cracow, Olsztyn, Piotrkow Trybunalski, Sosnowiec, Szczecin, Warsaw, and Wroclaw in 2020. The investigations were conducted using the volumetric method. *Alternaria* spore season was defined as the period in which 90% of the annual total catch occurred. The *Alternaria* season started first in Bialystok on May 19th and lasted on June 28th in Wroclaw. The highest airborne concentration of 1052 *Alternaria* spores/m^3 was noted in Wroclaw on July 30th. The highest annual sum of *Alternaria* spores (SPI) was observed in Warsaw (19 390 spores) and the lowest in Bialystok (5769 spores). Most days, the threshold concentration inducing symptoms in allergic persons occurred in Piotrkow Trybunalski, Szczecin, and Warsaw.

Key words: allergens, spores, Poland, 2020

Introduction

The genus *Alternaria sp.* belongs to the *Deuteromycota* group [1]. Around 300 species can be distinguished within this taxon. Many of them are commonly found in nature as saprophytes living on surface layers of soil, dying vegetation, and plant pathogens. The mentioned fungi are also found inside buildings [2–4]. The results of many studies show that although representatives of the genus *Alternaria* are not the most intensive or the longest in terms of fungi sporulation, the spores are considered to be the most allergenic [5, 6]. Spores of this type already appear in the air in the early spring. However, high concentrations of *Alternaria* spores are recorded in the summer, especially in the later period [7]. Rapiejko et al. [8] showed that the threshold concentration of *Alternaria* spores for the Polish population is 80 spores in 1 m^3 of air. On the other hand, a concentration of 100 spores in 1 m^3 of air provokes symptoms in all allergy sufferers.

Aim

The aim of the presented research was to compare the concentration of *Alternaria* spores in 2020 in Bialystok, Cracow, Olsztyn, Piotrkow Trybunalski, Sosnowiec, Szczecin, Warsaw, and Wroclaw.

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Material and method

The analysis of the concentration of *Alternaria* spores was performed based on data collected from the selected cities in 2016. The study was carried out using a volumetric method (Burkard or Lanzoni trap). Spores were counted under a light microscope (× 400) [9, 10]. The spores data were analyzed to determine the season's start and duration using the 90% method [9, 10]. The start of the season was defined as when 5% of the seasonal cumulative spore count was trapped. Moreover, the analysis also was determined the number of days with spores count above 80, 100, 150, and 300 in 1 m³ – threshold necessary to evoke allergic symptoms [8]. The course of the spore seasons in each city is shown in the graphs (fig. 1–4).

Results and discussion

Appointed by 90% method sporulation season of *Alternaria* in 2020 began at the earliest in Bialystok on May 19th, then in Szczecin on May 26th. In the remaining measurement points, the beginning of the *Alternaria* sporulation was between June 15th and 28th (tab. 1, fig. 1–4). The longest season of *Alternaria* germination was found in Bialystok – 124 days, while the shortest in Wroclaw – only 53 days (tab. 1). The date of maximum spore concentration was the earliest in Sosnowiec (July 22nd), Cracow (July 24th), and Szczecin (July 24th). The highest SPI was recorded in Warsaw – 19 390 (fig. 4), while a meager annual total was found in Bialystok – 5769 spores, Sosnowiec – 9309, and Cracow – 9410 (tab. 1). Most days with

Table 1. *Spore season for Alternaria in selected Polish cites in 2020 (90%).*

Site	Duration of pollen season (number and days)	Peak value [grains/m³] and peak date	Seasonal pollen index (SPI)	Days ≥ 80 grains/m³	Days ≥ 100 grains/m³	Days ≥ 150 grains/m³	Days ≥ 300 grains/m³
Bialystok	19.05–19.09 124	142 30.07	5769	15	10	0	0
Cracow	25.06–4.09 72	442 24.07	9410	44	37	21	5
Olsztyn	15.06–19.09 93	456 2.08	12 459	54	42	20	9
Piotrkow Trybunalski	22.06–17.09 88	603 31.07	18 569	61	52	43	22
Sosnowiec	18.06–21.09 96	407 22.07	9309	43	34	12	4
Szczecin	26.05–15.09 113	440 24.07	13 878	61	50	30	8
Warsaw	21.06–11.09. 83	672 31.07	19 390	61	54	42	26
Wroclaw	28.06–19.08 53	1052 30.07	15 232	42	35	30	17

Figure 1. *Alternaria pollen count in Bialystok and Cracow in 2020.*

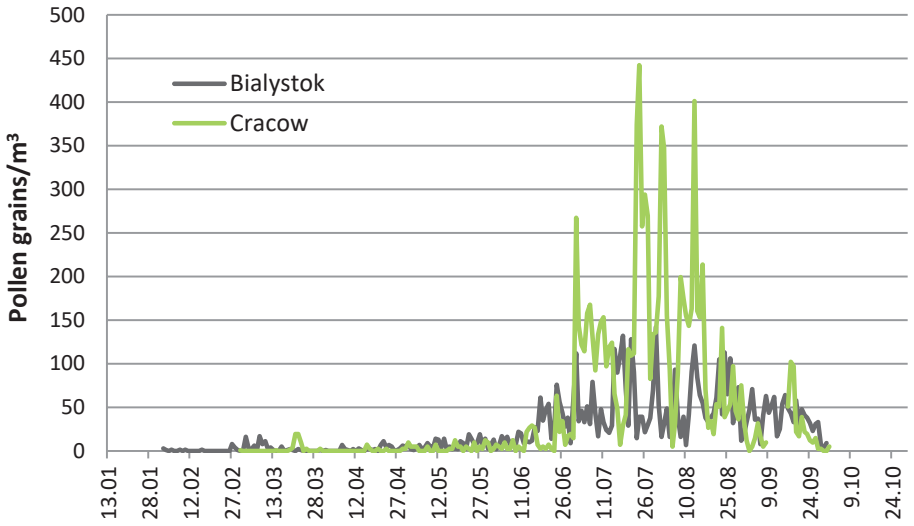


Figure 2. *Alternaria pollen count in Olsztyn and Piotrkow Trybunalski in 2020.*

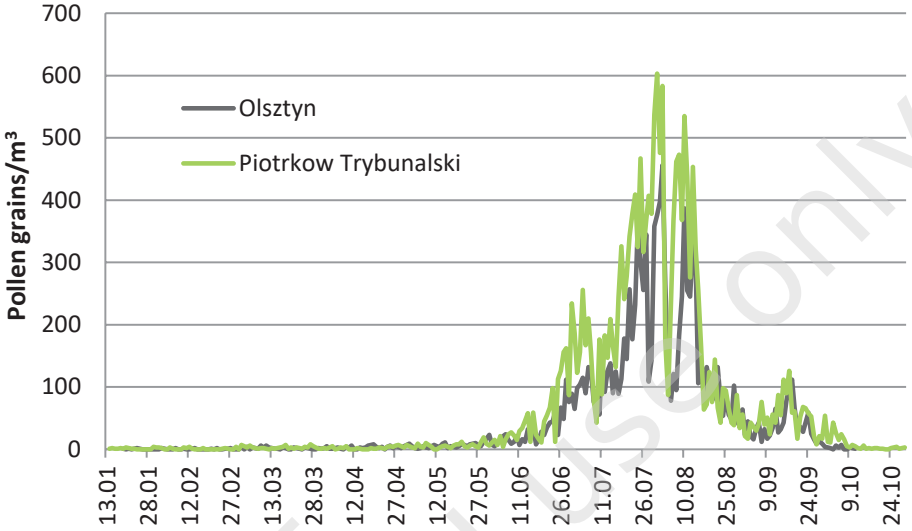


Figure 3. *Alternaria pollen count in Sosnowiec and Szczecin in 2020.*

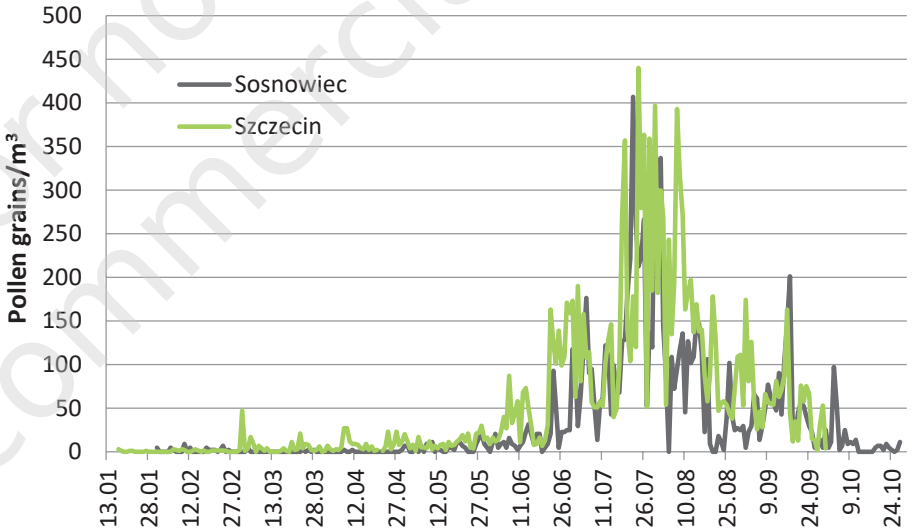
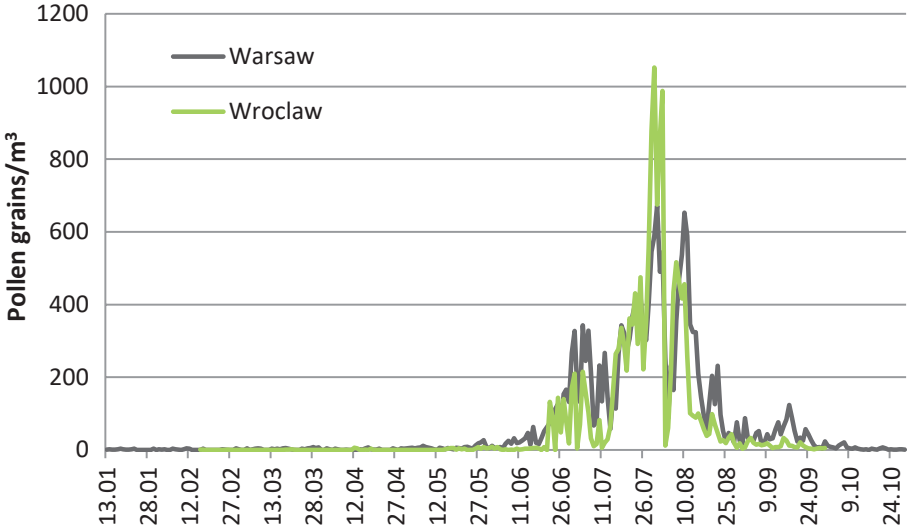


Figure 4. *Alternaria pollen count in Warsaw and Wroclaw in 2020.*



threshold concentration, which was troublesome for allergy sufferers, occurred in Piotrkow Trybunalski, Szczecin, and Warsaw. The lowest number of such days was definitely in Bialystok, where concentrations were so low that no single day with concentrations above 150 and 300 spores was recorded (tab. 1).

Conclusions

1. The sporulation season of the genus *Alternaria* in 2020, determined by the 90% method, started at the earliest in Bialystok (May 19th) and Szczecin (May 26th), the other measurement points between June 15th and 28th.
2. The longest season of *Alternaria* germination was found in Bialystok – 124 days, while the shortest in Wroclaw – only 53 days.
3. The date of maximum spore concentration was the earliest in Sosnowiec (July 22nd), Cracow (July 24th), and Szczecin (July 24th).
4. The highest SPI was recorded in Warsaw – 19 390, while the lowest in Bialystok – 5769 spores.
5. Most days, the threshold concentration inducing symptoms in allergic persons occurred in Piotrkow Trybunalski, Szczecin, and Warsaw.

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