

# *Alternaria* spores in the air of northern Poland cities in 2016

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**Abstract:** This paper presents the course of the spore season of *Alternaria* in Białystok, Bydgoszcz, Drawsko Pomorskie, Olsztyn, Szczecin and Warsaw in 2016. Measurements were performed by 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 Szczecin on the 31<sup>st</sup> March and lasted till the 22<sup>nd</sup> May in Białystok. The highest airborne concentration of 678 *Alternaria* spores  $\times$  m<sup>-3</sup> was noted in Białystok on the 11<sup>th</sup> July. The highest annual sum of *Alternaria* spores (SSI) was observed also in Białystok (16 921 spores).

**Key words:** aeroallergens, spores, mould, *Alternaria*, 2016

## Introduction

Fungi of the *Alternaria* colonize the superficial layers of the soil and dying vegetation [1, 2]. Most abundant *Alternaria* spores production are observed at 22 to 28°C [1, 2]. *Alternaria* spores are classified as dry spores, since they are released during warm and dry weather [1, 2]. In Poland the threshold value for first clinical symptoms for *Alternaria* spores for the majority of sensitised patients is visible during exposure to the concentration of 80 spores in 1 m<sup>3</sup> of air [3]. Symptoms were noted in all the subjects sensitized to *Alternaria* spore at the concentration of approximately 100 spores/m<sup>3</sup> of air [3]. During exposure to the concentration of 150 spores per m<sup>3</sup> the symptoms were acute (at 300 spores/1 m<sup>3</sup> there were wheezing and shortness of breath) [3].

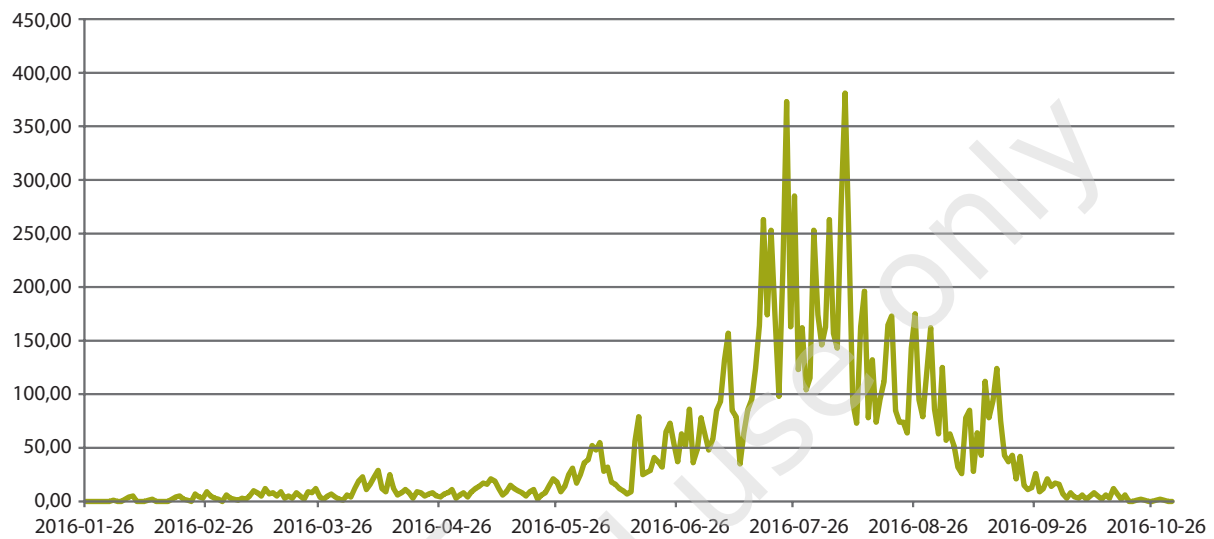
## The aim

The aim of the presented research was to compare the concentration of *Alternaria* spores in 2016 in Białystok, Bydgoszcz, Drawsko Pomorskie, Olsztyn, Szczecin and Warsaw.

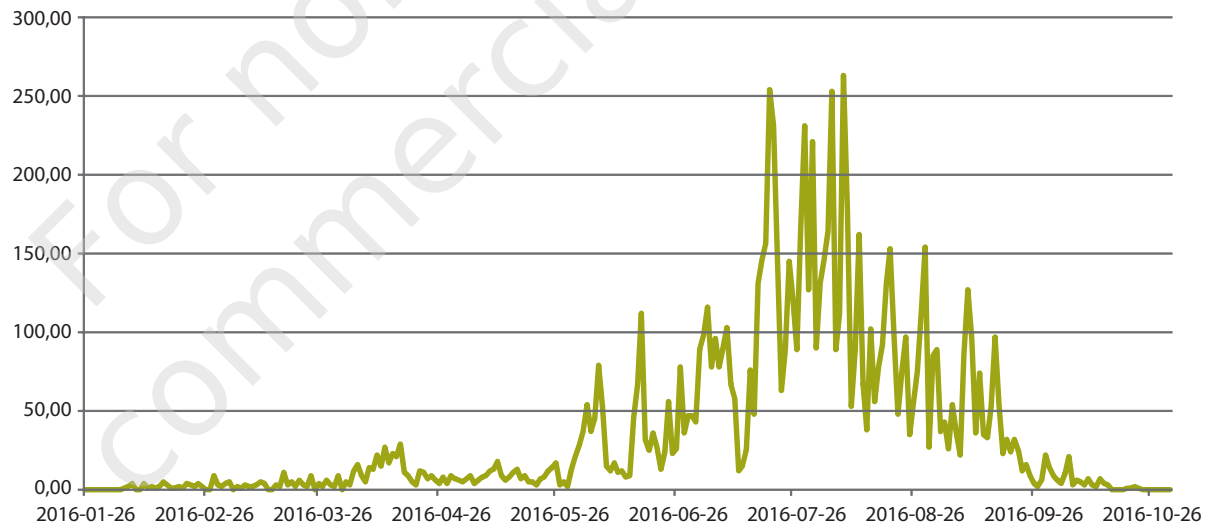
## Material and methods

The analysis of the concentration of *Alternaria* spores was performed on the basis of data collected of 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 ( $\times$  400) [2, 4]. The spores data were analysed to determine the start and duration of the season using the 90% method [2, 4]. The start of season was defined as the date

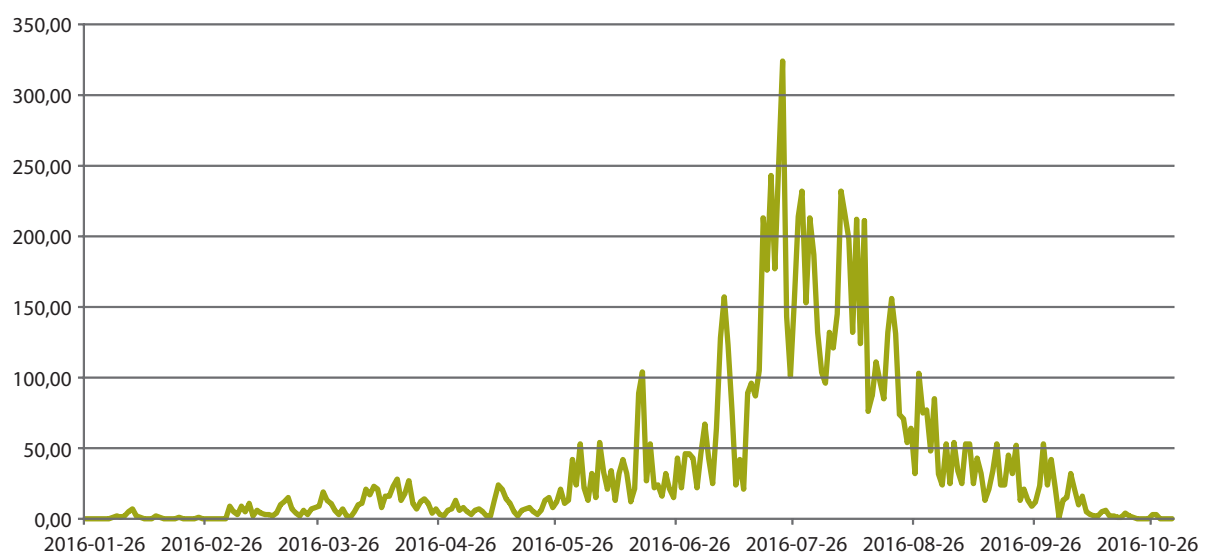
**Figure 1.** *Alternaria* spores in the air of Bydgoszcz in 2016.



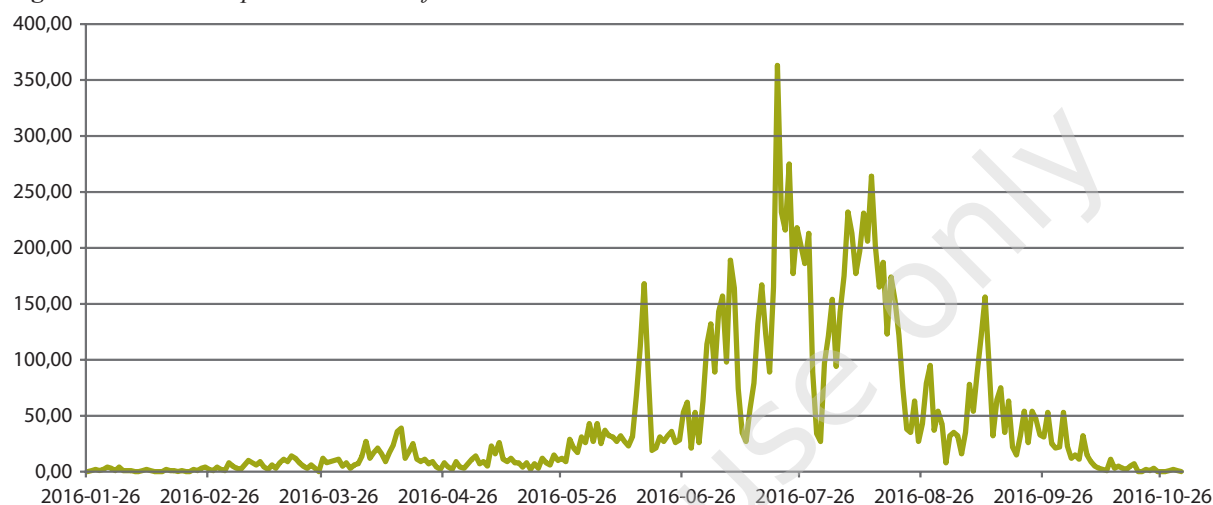
**Figure 2.** *Alternaria* spores in the air of Olsztyn in 2016.



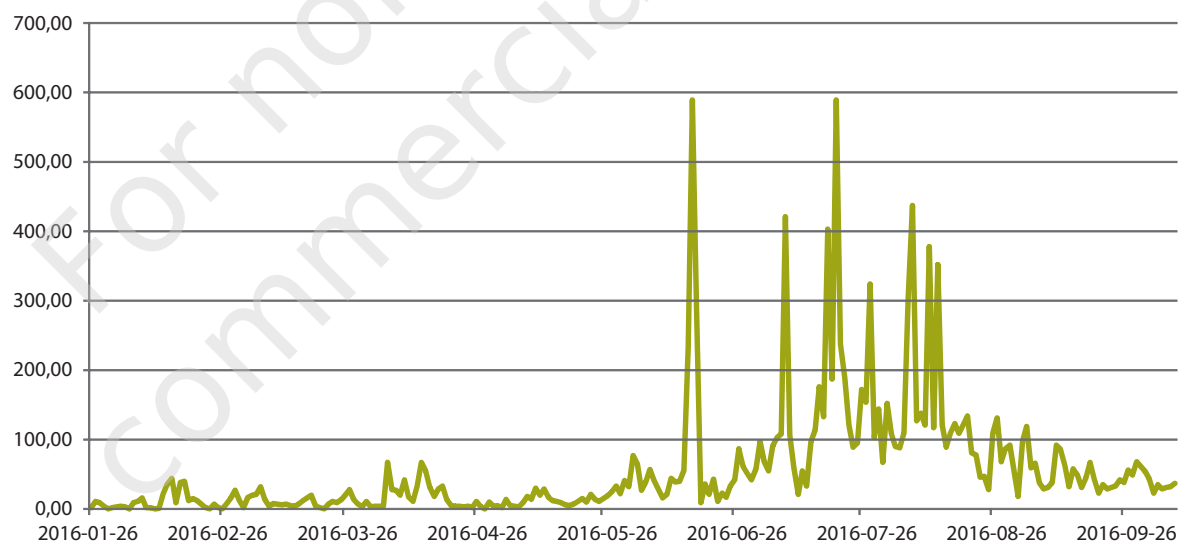
**Figure 3.** *Alternaria* spores in the air of Warsaw in 2016.



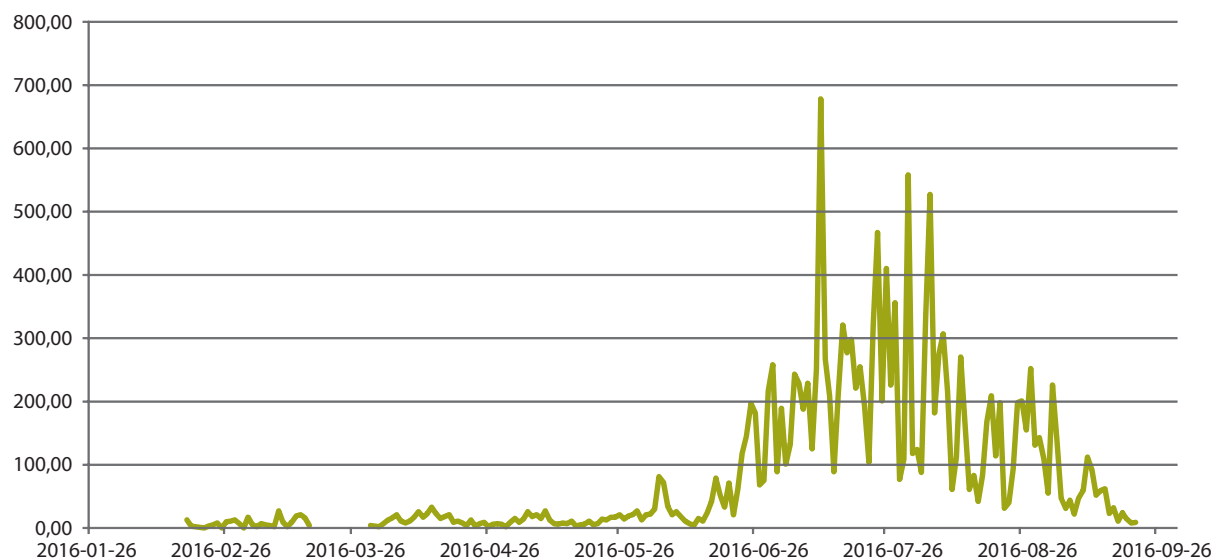
**Figure 4.** *Alternaria* spores in the air of Drawsko Pomorskie in 2016.



**Figure 5.** *Alternaria* spores in the air of Szczecin in 2016.



**Figure 6.** *Alternaria* spores in the air of Białystok in 2016.



**Table 1.** Spore season for *Alternaria* in selected Polish cities in 2016. The number of days with spores count above 80 spores in 1 m<sup>3</sup> – threshold necessary to evoke allergic symptoms. Seasonal Spore Index (SSI) was estimated as the annual sum of daily average spore concentrations (total).

station	start (date)	peak day (date)	end (date)	peak value	total (SSI)	days	≥ 80 days	≥ 100 days	≥ 150 days	≥ 300 days
Białystok	2016-05-22	2016-07-11	2016-09-03	678,0	16921,0	202	67	59	43	10
Bydgoszcz	2016-05-08	2016-08-08	2016-09-16	381,0	12456,0	265	53	39	25	2
Drawsko Pom.	2016-04-24	2016-07-20	2016-09-20	363,0	12316,0	264	51	41	30	1
Olsztyn	2016-05-02	2016-08-08	2016-09-15	263,0	10174,0	249	47	31	15	0
Szczecin	2016-03-31	2016-06-16	2016-09-20	589,0	14541,0	255	56	41	18	9
Warszawa	2016-04-22	2016-07-23	2016-09-18	324,0	10694,0	247	45	36	19	1

when 5% of the seasonal cumulative spore count was trapped. Moreover, in the analysis also was determined the number of days with spores count above 80, 100, 150 and 300 in 1 m<sup>3</sup> – threshold necessary to evoke allergic symptoms [3].

The highest *Alternaria* spores allergen hazard occurred in 2016 in Białystok. The period with spores counts exceeding the threshold value (≥ 80 spores/m<sup>3</sup>) lasted as long as 45–67 days.

## Results

Appointed by 90% method sporulation season of *Alternaria* in 2016 began at the earliest in Szczecin on the 31<sup>st</sup> March, and at most measuring points between 22<sup>nd</sup> April (Warsaw and Drawsko Pomorskie) and 2<sup>nd</sup> May (Białystok). Limit concentration of 80 spores per 1 m<sup>3</sup> air occurred early in Drawsko Pomorskie and Szczecin (15<sup>th</sup> June) and in a few days intervals at the other measuring points.

In 2016 the maximum daily concentration of *Alternaria* spores was observed between July 7<sup>th</sup> and September 2<sup>nd</sup>. The highest daily *Alternaria* spore count was noted in 2016 in Białystok (678/m<sup>3</sup>) and in Szczecin (589/m<sup>3</sup>) (tab. 1). The highest annual sum of *Alternaria* spore (SSI, Seasonal Spore Index) was observed also in Białystok (16 921) and it was about 1,5 times higher than in Olsztyn (10 174) and Warsaw (10 694). The highest *Alternaria* spores allergen hazard occurred (above 80 spores/m<sup>3</sup>) in Białystok (67 days). Spores concentration causing severe clinical symptoms (above 150 spores/m<sup>3</sup>) was noted also in Białystok (43 days).

## Conclusions

*Alternaria* season in most cities was characterized by very high total annual spores (even to 678 spores/m<sup>3</sup>).

The start of *Alternaria* season in 2016 occurred in April and May; in Szczecin as early as 31<sup>st</sup> March and lasted to the September.

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### Authors' contributions:

Chloupek A.: 50%; Rapiejko P.: 10%; Puc M.: 10%; Stacewicz A.: 10%; and other Authors: 5% each.

### Conflict of interests:

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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