



Longer, later, higher: changes in *Betula* pollen season in Ukraine from 2009 to 2022

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Introduction: Birch pollen is a leading source of allergies in the spring. About a quarter of people with seasonal allergies in Ukraine are sensitive to it, which makes birch pollination an urgent issue of the healthcare system. Birch produces and releases pollen in a certain period and with a certain intensity, which depends on environmental conditions and their changes. It should also be taken into account that this plant has a biennial pollen cycle in Ukraine, which causes significant exacerbation of symptoms in patients with the intermittent rhinitis in even years. Therefore, it is the task of aerobiologists to carry on regular pollen monitoring to contribute in prevention of contact of patients with the source of their allergy. However, the general tendencies of pollination change not only within the season, but also over a long period of time. These changes are primarily due to the climate change, which have been especially evident in recent years. Therefore, the purpose of our work was to identify the trends of these changes over the period of aerobiological monitoring in 2009-2022.

Method: Pollen collection was carried out by volumetric method using a Burkard trap of a Hirst type located at a height of 25 meters above the ground. It was located on the roof of the National Pirogov Memorial Medical University, Vinnytsya. Obtained air specimens were stained and analyzed under a light microscope with a magnification of X400. Statistical processing of the obtained data was carried out using the facilities of the European Aeroallergen Network and the Excel 2013 Program.

Results: Pollen trends revealed the tendency of the season delay: in 2009 the season started on March 25 (84th day of the year), in 2022 – on April 9 (99th day). Accordingly, the birch flowering peak date shifted from April 21 (111 days in 2009) to May 4 (124 days in 2022). May 4 was the last day of birch pollination in 2009, while in 2022 the end of the season shifted by a week to May 13 (day 133).

Along with the shift of the birch period to the later time, the amount of pollen grains that it produces has also changed: there is a trend towards an increase of pollen Index. In odd year 2009, 522 pollen grains/m³ were collected, and in 2021 there were 1667.3 of them, which is three times more. The pollen index of even years ranged from 9604 pollen grains/m³ in 2010 to 13696.4 pollen grains/m³ in 2022. The highest pollen index was recorded in the year 2014: 22832.7 pollen grains/m³; with a peak concentration 3791.4 pollen grains/m³. There is also an increasing trend in pollen peak values: 76 grains/m³ in 2009 vs 1485.2 grains/m³ in 2022.

Conclusions: so, birch pollination season in Ukraine starts later, lasts longer and, accordingly, ends later. In addition, the concentration of pollen has increased. These data should be used for pollen forecast in order to prevent excessive contact with allergens in patients with pollen allergy. It is important to continue implication of volumetric sampling in order to control *Betula* pollination changes due to climate change.

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