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Aeropalynological monitoring of allergenic plants in termiz city, Uzbekistan

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Abstract: This article provides a detailed review of the essence of aerobiological monitoring, the importance of conducting palynological researches. It also provides information on the progress of aerobiological monitoring and scientific research in Uzbekistan. In addition, it will be possible to get acquainted with the results of research on the relationship between the pollination season and meteorological factors of some plants that has an allergenic feature in the city of Termez.

Keywords: Lanzoni VPPS 2010, pollen grain, allergy, pallinosis, palynology, monitoring, Uzbekistan, light microscop.

Introduction: Social production changes the environment by directly or indirectly influencing all its elements. This influence and its negative consequences have become especially pronounced with the increase in the scale of human activity and during the modern scientific and technological revolution [1]. The biological component is the most objective factor that can show how favorable the territory is for living, and helps to determine whether the situation in a particular region is dangerous for humans or, conversely, favorable for living. The deterioration of the ecological situation leads to an increase in the level of allergies [9,10]. Pollen grains have the ability to adsorb various non-biological substances and particles on their surface and can carry various pollutants and dust over long distances. Environmental changes lead to significant changes in the protein shell of pollen grains, which in turn leads to an increase in allergic reactions in humans [8]. Environmental pollution leads to an increase in the period of pollination of plants. Therefore, monitoring pollen of allergenic plants in cities is especially relevant [2,6]. Numerous studies show the widespread occurrence of hay fever in the world, its important specific features. The distribution of pollen in the atmosphere, the differences in the species composition of pollen allergens, confirm the importance of studying the nature of the distribution of these allergenic plants in all natural zones and determining them in the aeropalynological regime. In the occurrence and development of hay fever, natural geographical conditions, the nature of the vegetation, the distribution of allergenic plants, the time and duration of their flowering, the quantitative and qualitative composition of pollen in the air play an important role [4]. Aeropalynological monitoring of allergenic plants should provide an idea of the changes in pollen levels, allergenic plants and their pollen complexes for each region, depending on the season and weather conditions. A person must have 500 pollen grains for the disease to develop, that is, he must breathe air with a concentration of at least 25 pg/m3 [3]. To determine the concentration of pollen in the air, allergists of the International Center for Molecular Allergology of Uzbekistan and researchers of Samarkand State University conducted aeropalynological studies. Lanzoni VPPS 2010 dust traps were installed throughout the republic for aerobiological monitoring. Experts provide information on the results of the observations to the population, as well as to people

suffering from hay fever, on the qualitative and quantitative composition of pollen of allergenic plants and fungal spores in the air of large cities during the period of pollination and spore formation every day (throughout the year) (information is provided via SMS messages to the short number 3700 and via the website www.icma.uz). Pollen monitoring was carried out in accordance with modern aeropalynological research methods [11]. Aeropalynological studies, along with phenological and meteorological observations, are necessary for the development of the urban landscape.

METHODS

Aerobiological monitoring in Termez was carried out using a Lanzoni VPPS 2010 dust trap. The results obtained were analyzed quantitatively and qualitatively under an optical microscope, and the results were supplemented. As a result of the study, the concentration of plant pollen grains in the urban atmosphere was determined and systematically analyzed to the genus level. In addition, a pollen calendar of plants was compiled. Advantages of the palynological method used in the study:

1. Each pollen grain (p.g.) and spore can be identified to the family, genus, and sometimes species level due to its morphological characteristics.

2. Higher plants produce a large number of pollen grains and spores, the shell of which falls to the surface of the earth and, while preserving its morphological characteristics, turns into rock and becomes a component of sedimentary deposits.

3. Both pollen grains and the shell of spores (sporoderm) consist of a chemical composition, including sporopollenin, that is resistant to various physical and chemical influences. Due to such a characteristic morphological structure, pollen grains and spores are easily transported by wind, water, birds, and insects. Today, the influence of various abiotic factors on them is also being considered within the framework of aerobiological studies [11].

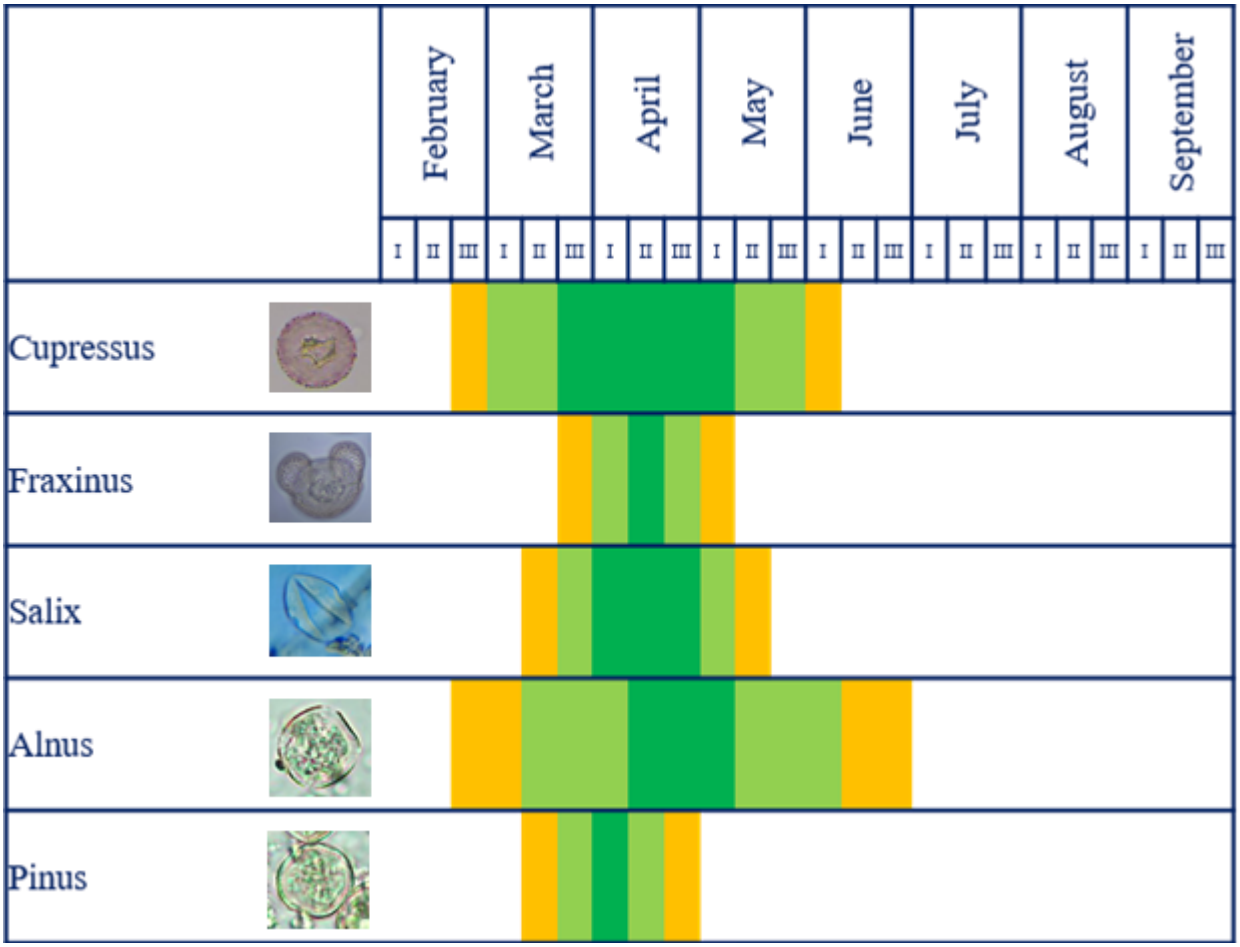
RESULTS AND DISCUSSION

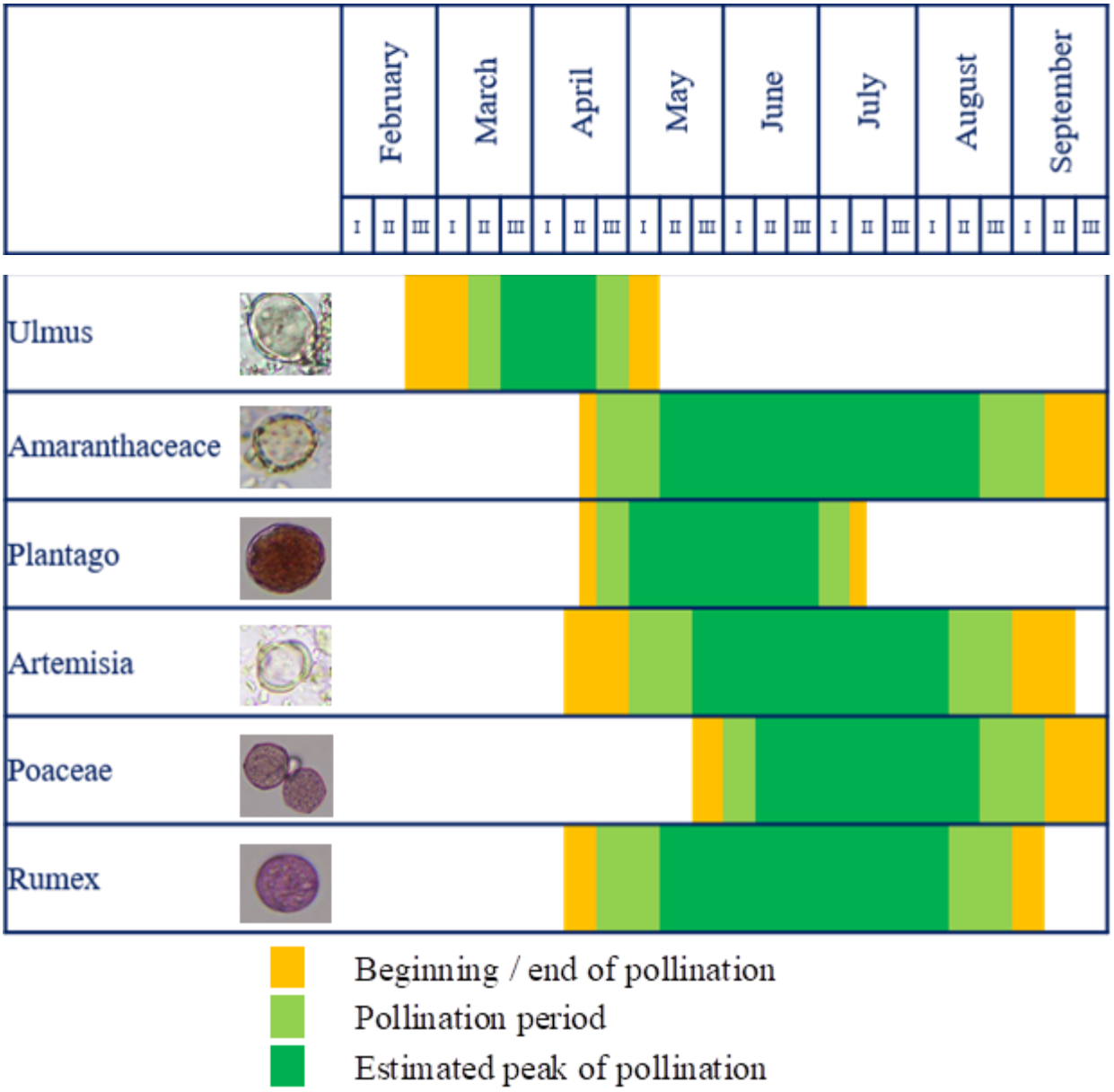
Pollen rain, its formation patterns, seasonal characteristics and daily dynamics of pollination of individual taxa, the role of pollen in the formation and development of hay fever, changes in the properties of pollen grains and the structure of pollen grains under the influence of a changing environment are currently among the problems that are actively discussed in the scientific literature[5]. Modern aerobiological studies study the taxonomic composition of the aerospectrum in different regions, estimate the share of various taxa, including allergenic pollens. The time of onset and duration of pollination of taxa are determined; the influence of various meteorological parameters on the concentration of pollen in the atmosphere; aerobiological data are combined with data from allergological tests to determine the cause-and-effect relationship between the presence in the air of certain plant pollens and the occurrence of allergies, the taxonomic relationship of aeroallergens characteristic of the studied regions, and the time of their appearance in the air spectrum. [11].

The following taxa typical of the flora of Termez demonstrate allergenic properties according to the list recommended by the Allergology Center:

- Alnus (A. glutinosa),
- Corylaceae (Corylus),
- Cupressaceae (Cupressus, Juniperus, Taxus),
- Oleaceae (Fraxinus),
- Betula (B.pendula),
- Pinaceae (Picea, Pinus),
- Quercus (Q.ilex, Q.cerris, Q.robur, Q.rubra),
- Poaceae,
- Rumex (R. acetosa, R. crispus, R. obtusifolius),
- Plantago (P. coronopus, P. lanceolata, P. major, P. media),
- Moraceae
- Amaranthaceae,
- Artemisia (A. annua, A. verlatorum, A. vulgaris),
- Ambrosia (A. artemisiifolia, A. elatier).

The relationship between the pollen concentration of the above-mentioned plants in the atmosphere, pollen season and meteorological factors was determined as a result of palynological studies conducted in Termez in 2024-2025, and the studies are ongoing. Based on the results obtained, it is intended to draw conclusions about the risk of allergies and provide recommendations and suggestions for eliminating or reducing the risk. The data presented in Figure 1 below represents the pollen calendar of these plants.


February
March
April
May
June
July
August
September
I II III I II III I II III I II III I II III I II III I II III I II III
Cupressus
Fraxinus
Salix
Alnus
Pinus



Figire 1. Pollen calendar of Termez city 2024.

The beginning of pollination depends on the regions, or rather, on the meteorological factors in the regions. Surkhandarya region is located on the southern part of the republic, and the high temperature and early start of the season affect the phenology of plants, as well as the pollination season [7]. From the picture above, it is clear that the flowering season of the plant begins from the last decade of February and lasts until early autumn. The pollination season is different for trees and grasses, with the pollination season of trees mainly falling in spring, and for grasses, it occurs in summer and autumn. Taking into the account the timing of the onset of pollination and the waves of plant pollination identified by the author, it is possible to predict the periods of pollination of deciduous, coniferous, cereals and some weed groups of plants.

CONCLUSION

Pollen allergenicity monitoring is an old problem that requires new solutions. However, sometimes the will to innovate the field tends to overcome the necessity of standardised, comparable data. Nowadays there is a wide range of different methods available for pollen monitoring, but their relative efficiency is sometimes unclear. This divergence of approaches is partly rooted in the geographical variability of pollen allergies and plant diversity, that makes it difficult to extend local results

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