PALYNOLOGIC ANALYSIS OF ALLERGENIC SPECIES IN ORADEA AND ARAD (ROMANIA) AREA BETWEEN 2012-2014

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Abstract

A great number of the anemophilous species have an allergenic potential. The pollen released by them irritates the mucosa of the sensitive individuals, initiating the occurrence of allergic diseases. Qualitative and quantitative studies of airborne pollens for Romania are just a few, but are very important. Many species become allergens because sometimes occur changes in the structure of their pollen grains. We collected the pollen of 14 allergenic species from the same place in Oradea and Arad, in consecutive three years, respectively in 2012, 2013 and 2014. We determined the percentage of modified pollen grains.

Keywords: palynology, allergenic species, atypical pollen grains

INTRODUCTION

There are large numbers of organic particles in the air, some of them having significant effects on the human body. The bio particles from the air are the major cause of respiratory disease, allergies, asthma and other respiratory tract infections.

The bio particles from the air include pollen grains, viruses, bacteria, fungal spores, moss spores, fern spores, (Juhasz et al, 2000, Juhasz et al, 2002, Juhasz et al, 2004, Faur et al, 2003, Ianovici, 2007).

Palynology is the science that studies palynomorphs, which includes the pollen of the gymnosperms and of the angiosperms as well as the spores of the inferior plants and of the pteridophytes (Juhasz et al, 2011, Dinescu C. et al, 2005, Smith, 1990).

From the 2200 species of Spermatophyte which living in Romania, approx. 250 can cause allergies. Many of the anemophilous species are allergenic; the pollen released by them irritates the mucosa of the sensitive individuals, initiating the occurrence of allergic diseases (Pallag et al, 2011).

Pollen allergies present a seasonal character in Romania and it manifests as allergic rhinitis, allergic conjunctivitis, rhino conjunctivitis or allergic asthma (Tarnavschi I. T. et al 1987).

Polyposis with a continuous increasing incidence in the present, are easier to prevent then to cure.

Qualitative and quantitative studies of airborne pollens for Romania are just a few, but are very important (Bulla et al, 1963, Popescu, 1969, Faur et al, 2003, Ianovici, 2007, Pallag et al, 2011).

MATERIALS AND METHODS

There were identified and studied the airborne pollens in Oradea and Arad area. The cities are finding at a distance of approximately 110 km, shows a climate alike, which explains the similarity between spread plant species.

The morphological and structural particularities occurring at microscopic level have been studied.

Between studied species are herbaceous and woody plants too, which are in order of flowering: *Alnus glutinosa, Corylus avelana, Betula verrucosa, Salix alba, Carpinus betulus, Fraxinus excelsior, Sambucus nigra, Tilia sp., Hordeum sp., Urtica dioica, Artemisia absinthium, Taraxacum officinale, Ambrosia artemisifolia* (www. nspolen.com, www.polleninfo.org).

We collected the pollen of this species from the same place, in Oradea and Arad, in consecutive three years, respectively in 2012, 2013 and 2014. We determined the percentage of modified grains. The morphological and structural particularities occurring at microscopic level have been studied.

The structures have also been compared to the standard shapes described in manuals (Ogden et al, 1974, More et al, 1991, Hesse et al, 2008, Jager et al, 2008). Due to the small size of the pollen grains, analysis is performed at a microscope at 400X.

RESULTS AND DISCUSSIONS

We have monitored the structural and morphological characteristics of pollen grains, collected from different species of allergenic plants found in Oradea and Arad area.

The morphopalynological studies began in Oradea area, in the past years, after 2012 we extended them to Arad area, too. 14 species were studied of which at only 6 had been observed morphological changes.

At the typical form the exine sculpture is described in manuals. We determined the percentage of modified grains in the studied three years. We numbered 1000 grains and determined the percentage of modified specimens. The results are presented in figures 1, 2, 3, 4 and 5.

At all species with recorded changes an increase can be observed of the percentage of atypical grains, from year to year, but with small values.

The results are similar to those presented in previous works, from 2011 (Pallag et al, 2011).

At *Carpinus betulus* had been identified morphologically modified pollen grains at Oradea area and Arad area, too (figure 1).

At *Carpinus betulus* pollen grains, the exin is less grainy, sometimes five pores appear instead of 4, the numbers of these modifications increase from year to year.

Fraxinus excelsior shows weak reticulated exine, almost smooth (figure 2). At *Sambacus nigra*, the harvested grains show many roughness and atypical growths on the exine's surface (figure 3).

At the *Ambrosia artemisifolia* most of the collected grains correspond structurally and morphologically to the typical form, only few specimens present small structural changes, sporodermis surface presents short but sharp peaks (figure 4).

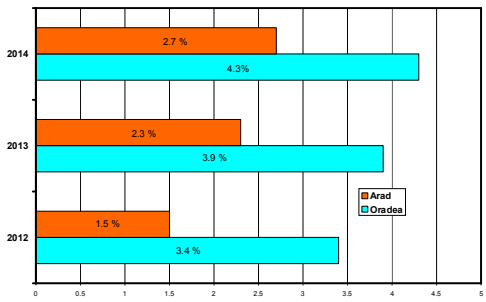

Fig.1. Percentage of modified pollen grains at *Carpinus betulus*

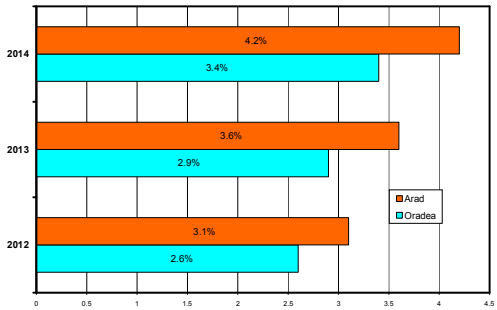

Fig.2. Percentage of modified pollen grains at *Fraxinus excelsior*

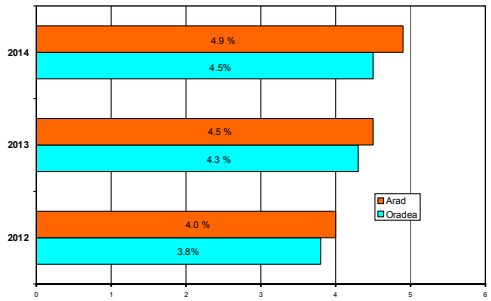

Fig. 3. Percentage of modified pollen grains at *Sambucus nigra*

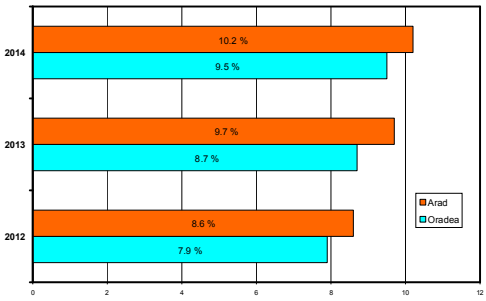

Fig.4. Percentage of modified pollen grains at *Ambrosia artemisifolia*

In case of *Alnus glutinosa* species, *Corylus avelana* there had been identified modified grains only in Oradea area in the 2013 and 2014 years.

We noticed microscopic changes. Most harvested grains correspond structural and morphological to the typical form, only at a few species occur structural modifications (Figure 5).

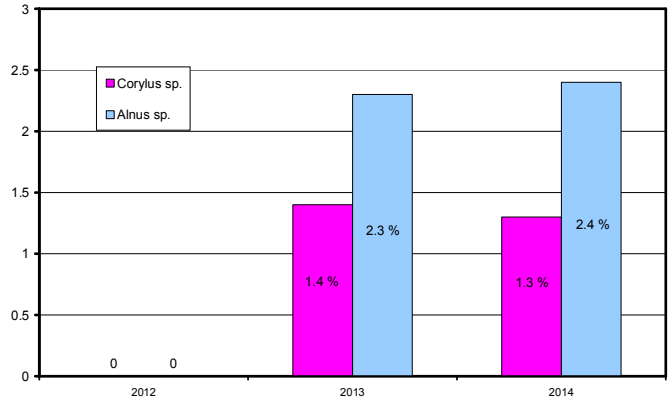

Fig.5. Percentage of modified pollen grains at *Corylus sp.* and *Alnus sp.*

At the *Alnus glutinosa* and *Corylus avelana* species we observed that in 2014, because of the winter was warmer, the pollen grains already appeared in January. In 2012 and 2013 the pollen grains only appeared in February.

In the percentage of change specimens appear an increase compared the three studied years (2012- 2014).

The differences between the two areas are very small. The most significant changes, close to 10% can be observed at only the *Ambrosia artemisifolia*, being the most allergen species in the same time (Figure 4).

CONCLUSIONS

The monitoring of airborne pollen is very important, harvesting, identification, the quantification, should be extended to a growing area.

The exposure to pollen of sensitive individuals it cannot be avoided, however, preventive measures can be taken, through access to current information about their concentration in air, seasonal debut, peak periods, the length of the season.

This information can be very useful for pollinosis patients and for a specialist doctor

Allergens identifying can contribute to the orientation of specific prophylaxis measures; the evaluation of the role of the allergens in sensibilisation, in the hyperactivity of an organ; the directing of immediate and long term therapeutic plans, including specific immunotherapy with allergens vaccine. Therefore we continue our studies in 2015.

REFERENCES

1. Bulla, A., Saragea, M., Molan, N., Ifrim, M., 1963, Determination of atmospheric air pollen infestation in Bucharest and value uno sensitized allergenic pollen preparations, Med Int., 15, 9, pp. 1043-1053
2. Dinescu, C., Zvorişteanu, A., Nemeth, T., 2005, Allergy and allergenic plants, Direcţia de Sănătate Publică Bihor, Oradea
3. Faegri, K., Iversen, J, 1992, Textbook of Pollen analysis, Ed John Wiley and sons
4. Faur, A., Ianovici, N., Nechifor, C., 2003, Airpalinology Research Implications In Allergic Diseases, Annals of West University of Timişoara, ser. Biology, vol. III-IV, pp. 7-14
5. Hesse, M., Halbritter, H., Zelter, R., Webwer, M., Buchner, R., Frosch-Radivo, A., Ulrich, S., 2008, Pollen Terminology, An illustrated handbook, Springer, Wien-NewYork
6. Ianovici, N., 2007, Aeropalinologic analysis of Timisoara (Romania) during 2006 year, Analele Universitatii din Oradea, Fascicula Biologie, Tom XIV, pp. 96-100
7. Jäger, S., Šikoparija, B., Yankova, R., Radišić, P., 2008, Prediction of severity of *Ambrosia* seasons by means of linear regression models. 8th European Pollen Symposium.
8. Juhász M., Babiak, J., Radisik, P., Faur, A., Borbely, B., 2000, First results of an international aeropalynological cooperation in the Danube-Cris-Mures-Tisa euroregion, second European Symposium of Aerobiology, sept. 5-9, Vienna, Austria, pp. 97.
9. Juhász, M., Oravecz, A., Radisik, P., Ianovici, N., Juhasz, I. 2001, Ragweed pollen Pollution of Danube-Cris-Mures-Tisa Euroregion (DCMTE) in Galbacs Z. (ed.) Proceedings of the 8th Symposium on Analytical and Environmental Problems, Szeged, Hungary, pp. 210-215
10. Juhász, M., Juhasz, I. Radisik, P., Faur, A., Ianovici, N., 2002, Seasonal pollen concentration of allergenic plants in the DCMT Euroregion – Abstracts of 4th Regional Conference on environmental and Health, Szeged, pp. 42
11. Juhász, M., Juhasz, I. Gallovich, E., Radisik, P., Ianovici, N., Petrenel, R., Kofol-Seliger, A., 2004, A Karpat –medence deli reszenek parlagfu pollenkoncentracioja 2000-2004, in Szabo T., Somlai J. (eds) Kornyezeti artalmak es a legzorendszer XIV, pp. 133-142
12. Moore, P. D., et al., 1991, Pollen Analysis, (Second Edition), Oxford, UK: Blackwell Scientific Publications., Bad Lippspringe, Germany.
13. Ogden E.C., Raymor G.S., Hayes G.V., Lewis D.M., Haines J.H., 1974, Manual for sampling airborne pollen, H.J. Hafner Press.
14. Pallag, A., Bungău, S., Gîtea, D., Blidar, C. F., 2011, Pollen microscopic identification of allergenic species in Oradea area, Analele Universităţii din Oradea. Fascicula Protectia mediului, vol XVI, pp. 130-136
15. Pallag, Annamaria, Szabo, Ildiko, Ritli, Ladislau, Hoeniges, Ana, (2011), Palinological study of *Ambrosia artemisifolia l*., Analele Universităţii din Oradea. Fascicula Protectia mediului, vol XVI, pp.137-142
16. Popescu, I. Gr., Capetti, E., Dragomir, I., Dragulescu, I., 1969, Contribution to the Quantitative and Qualytative Study of atmospheric Polen and Fungi in Three Towns on the Southern Sub-carpathian Zone of Romania, Rev. Rom. Med Int, 6, 6, pp. 397-402

17. Smith, E. Grant, 1990, Sampling and identifying allergenic pollens and molds – An illustrated Identification Manual for Air Samplers, Blewstone Press, san Antonio, Texas.
18. Tarnavschi, I. T., Şerbănescu-Jitariu, G., Mitroiu-Rădulescu, N., Rădulescu D., 1987, Monografia polenului florei din România, vol. I-II, Editura Academiei Republicii Socialiste România, Bucureşti.
19. *** www.nspolen.com/nspolen
20. *** www.polleninfo.org