PALINOLOGICAL STUDY OF *AMBROSIA ARTEMISIFOLIA L.*

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Abstract

Palynology is the science that studies pollens. Anemophilous plants represent the major source of pollen, small sized pollen grains are carried away by the wind at great distances from the source. Many of the anemophilous species are allergenic. *Ambrosia sp.* pollen is a major cause of pollen allergy. This species occupies from year to year a larger area in Oradea.

In this study we analyzed the morphological features of *Ambrosia artemisifolia* L pollen, collected from the same place in consecutive three years. Most of the collected grains correspond structurally and morphologically to the typical form, only few specimens present small structural changes, but the number of these specimens increases from year to year.

Keywords: *Ambrosia artemisifolia* L, pollen morphology

INTRODUCTION

Palynology is the study of fossil and modern pollen grains and spores. It is a relatively recent science and there are many opportunities for its practical application. The study of the symmetry, polarity, shape, size, structure, sculpture and of the apertures of the sporodermis can be very useful to many other sciences (Tarnavski et al, 1987).

A plant's mode of pollination has consequences for the volume of pollen released. Autogamous, self-pollinating plants produce as few as 100 pollen grains per anther. Such pollen is rarely encountered in forensic samples in volumes large enough to be useful. Zoogamous, animal-pollinated plants release much more pollen than autogamous plants, but not nearly as much as anemophilous, wind-pollinated plants, some species of which produce as many as 70 000 pollen grains per flower. Anemophilous plants include all of the gymnosperms, some angiosperms, and the spore-producing lower plants (Dinescu C et al, 2005). Many of the anemophilous species are allergenic, the pollen released by them irritates the mucosa of the sensitive individuals, initiating the ocurrance of allergic diseases (Szabo I, Pallag A., 2007). *Ambrosia sp.* pollen is a major cause of pollen allergy.

In Romania the first information about this species dates from the year 1908. The plant is present in the zones of Banat, Moldova, Muntenia and a part from Transylvania. The alerts of the Ambrosia artemisifolia on Romania's territory from this period, identified only individual examples or too small population, the botanists didn't offer too much interest, not

knowing the injuring effects caused by the flowers' pollen of this plant, especially when it lives on extended areas.

After 1990 many farmlands have been abandonned in the forestry sector there have been clearings, the weeds from the agricultural crops have been disproved, so that on the sidewalks and on the railways, Ambrosia artemisifolia extended a lot in spontaneous flora, invaded agricultural crops, living in extended population which often occupy more hectares.

Although it is dangerous for our health, due to the pollen produced in the time of blossoming, containing more than 20 gr/inflorescence, this plant is not known officially in Romania as a quarantine plant.

The danger what the extending of this plant represents isn't its competition with crop plants but the extremely serious effect on human's health caused by the pollen in the blossoming time. The spreading areas of the species are the following: the counties of: Maramures, Bihor, Cluj, Giurgiu, Vaslui, Bucuresti.

In Bihor county there are large numbers of surfaces invaded by this plant, by shoulder the produced pollen is a permanent source of allergies for sensible persons to this allergens.

The recognition of the plant is difficult because it can be confused with other allied plants. It is confused with a specie of mugwort (sagebrush), *Artemisa vulgaris*. The name of the ambrosia is tributary to these similarities. Artemisifolia shows the similarity of the leaves, folia, of the ambrosia with the leaves of the sagebrush from the Artemisia kind (Sikoparija B et al, 2006, Bojovic j et al, 2008, Ambelas S C et al 2009).

Its admission as a quarantine plant, pollutant from biological point of view, means testing of cognition and recognition of its repercussion of the human health, systematic informing of the population by elaborating a national program of radication (Stanisavljev, B et al 2008, Jager s et al, 2008).

MATERIAL AND METHODS

We collected the pollen of *Ambrosia artemisifolia* L. from the same place in Oradea, in consecutive three years, respectively in 2008, 2009 and 2010. We determined the percentage of modified grains in the studied three years.

In order to recognize pollen grains a number of characteristics are taken into account: size and shape, the number of colpi and/or germination pores and their position, the structure of the cell wall.

The morphological and structural particularities occurring at microscopic level have been studied. The structures have also been compared to the standard shapes described in the manuals. Due to the small size of the pollen grains, analysis is performed at a microscope at least 200x.

RESULTS

Pollen is produced in the microsporangium, contained in the anther.

Ambrosia artemisifolia L. pollen type is routinely distinguished from other members of the Asteraceae or Compositae plant family by its short spines, its short furrows, and the presence of cavae - three gaps in the outer wall. However, these features are variably expressed.

Sculpture means the ornamental elements modeling the sporodermis surface, clearly visible in polar or equatorial view.

The sculpture form in Ambrosia is echinate, the sporodermis surface presents a series of more uniformly distributed spina-shaped ornaments. Short and rounded spinae are also freqvent in *Ambrosia artemisifolia* L. pollen (Šimić, S et al, 2007, Hesse M. et al, 2008).

The normal morphological structure we can analized in fig 1, 2 and 3.

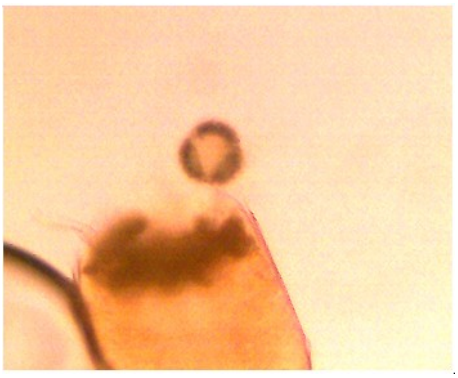

Fig.1. Ambrosia artemisifolia L. pollen. Pollen grain leaves the pollen tube, there are three gaps in the outer wall (optical microscopy image 200X)

Most of the collected grains correspond structurally and morphologically to the typical form, only few specimens present small structural changes, as for example the one in figure 4 and 5.

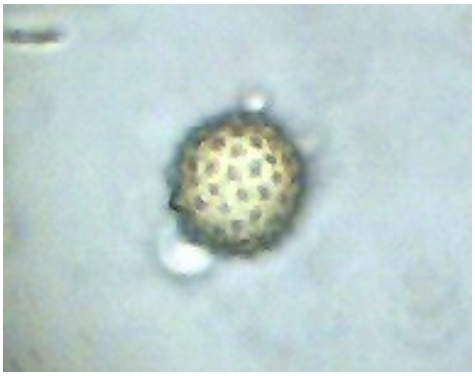

Fig.2. Ambrosia artemisifolia L.normal pollen grain (optical microscopy image 200x)

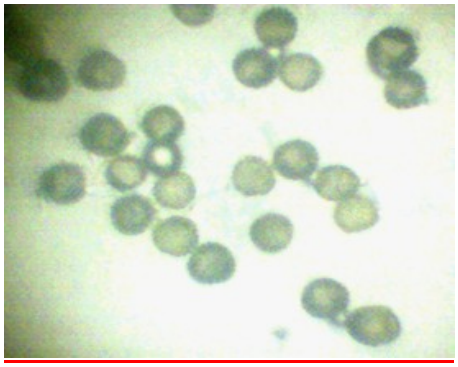

Fig.3. Ambrosia artemisifolia L.normal pollen grains
(optical microscopy image 100X)

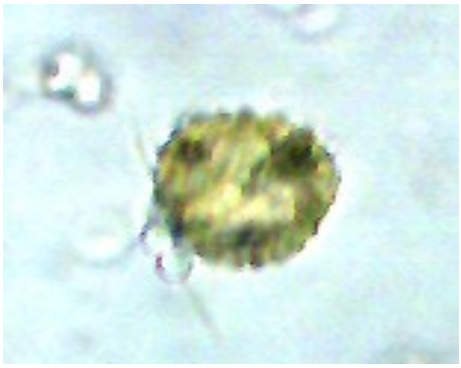

Fig.4. Ambrosia artemisifolia L., morphological change pollen grains
(optical microscopy image 400X)

Fig.5. Ambrosia artemisifolia L., morphological change pollen grains
(optical microscopy image 400X)

At the typical form the exine sculpture shows short and rounded spinae, while some of the collected grains show echinate sculpture form with slight change. The sporodermis surface presents short but sharp peaks. 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 is presented in figure 6.

In 2010 the percentage of change specimens is double compared to previous year.

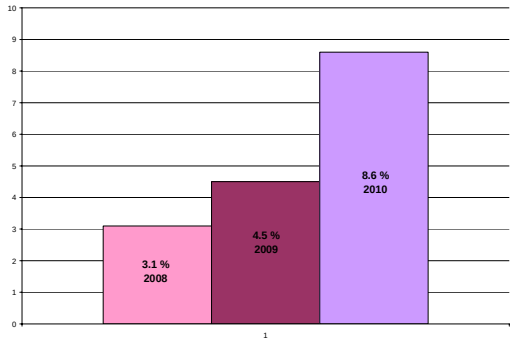

Fig.6. Percentage variation of modified pollen grains

COCNLUSIONS

It was observed that at the end of August and September this plant caused allergic reactions.

In 2000 the blossoming of the plant took 143 days, producing 2861 pollen grains /m^2.

Ambrosia artemisifolia L. is a course of naturalization and acclimatization in Romania, tending to become a focar of irradiation. Having a great capacity of fructification and vitality it is not excluded the possibility of an "ecological explosion" with great interferences on our health. Therefore it is urgent imposed the declaration of this plant right biologically pollutant or a quarantine plant.

We achieved this palinological study obtained from the same part of the town Oradea, consecutive three years, 2008, 2009, 2010.

From one year to another it can be observed the increasing number of individuals in the same area, together with the stretching of the affected areas, due to the lack of applying some control methods.

At the morphological level of the studied pollen, a decreased number of pollens can be observed, with modified exine in the year of 2008, this number increasing slightly in the period of study, but in 2010 the percentage is double compared to 2009. Maybe together with invading some areas much bigger with individuals of this species, the possibility of appearance the morphological modification increases.

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