

Holocene Trend for the Urticaceae Family, in Central Albania

Admir Jançe^{1,*}, Anila Jançe², Gëzim Kapidani³

¹"European University of Tirana", Tirana, Albania

²"Barleti" University, Tirana, Albania

³"Tirana University", Tirana, Albania

*(adi_jance@yahoo.it) Email of the corresponding author

Abstract – Regarding to the advanced scientific research trend in the paleopalynology, in this paper we have tried to present data on fossil palynofoms, belonging to the New Holocene period, for representatives of the Urticaceae Family (mainly *Urtica* type).

The obtained results from the analysis of fossil pollen, by analyzing the soil sediments, present an overview of the Urticaceae family distribution around the New Holocene period (the last 20 centuries), for the Elbasan area, which lies in Central Albania.

The analyzed samples, weighing 0.5 kg of soil, were taken in the field from a depth of 4 m to the surface. These samples were taken at five stations in Elbasan - Central Albania, during the October-December 2022 period, using a dry rotary drilling probe with a diameter of 110 - 130 mm.

The main goal to carry out this advanced scientific research has been the presentation of the evolutionary line that the representatives of the Urticaceae family have followed during the New Holocene period.

From the analytical processing of the data, we concluded that: 946 Urticaceae Family Palynomorphs (*Urtica* type) are present in all the soil samples analyzed from 4 m of depth to the earth surface, showing mainly an increasing trend of these palynomorphs, in the earth's surface direction. This result leads us to the opinion: the vegetation change that occurred over the years, is mainly related to the human hand influence, since there is no data on important factors to have influenced the vegetation change.

Keywords – Palynofoms, Paleopalynology, Holocene Trend, Urticaceae Family, Elbasan.

I. INTRODUCTION

Paleopalynology is an interdisciplinary science related to biological and geological sciences that deals with the study of acritarchs, chitinozoans, scocodonts, but mainly, which is also the object of our study, with fossil palynofoms [1], [2]. Analysis and the study of fossil pollen of different plants allows us to evaluate the performance of the primitive and specialized features of the external pollen wall [3]. Fossil pollen can survive over the years, as the outer pollen wall or exine is extremely resistant [4], [5].

The studies carried out on the New Holocene deposits provide us with important input about the influence of various factors on the vegetation diversity over a certain analyzed area [5]-[7]. This

scientific study type gives us the opportunity to present important data regarding the reconstruction of the paleoclimate, paleoflora and stratigraphy of the Holocene [1], [2].

This scientific study we have undertaken provides paleopalynological data about *Urtica* type belonging to the New Holocene deposits, on Elbasan area.

The evolution that the microfossil plants of the *Urtica* type have undergone over the years has not been studied before for the Elbasan area and there is any study by foreign and local researchers about the *Urtica* palynomorphs in the New Holocene sediments of Elbasan area [5]-[7].

The paleopalynological data obtained provides a fundamental contribution to the evolution of the

cultivation and use of different plants, as well as on the origin of vegetation [8].

Urtica palynomorphs counts were performed using light microscopes at 1000x magnification.

The data obtained on the fossil spores of *Urtica*, deposited underground, show the Holocene evolution followed by *Urtica* type over the years.

II. MATERIALS AND METHOD

Through the paleopalynological data we judge for the human impact on the natural environment change [9], [10]. Palynological examinations are used for paleoecologic studies for the Quaternary period therefore and the New Holocene period [11], [12].

Paleopalynological examination showed that all samples contained a large quantity of organic matter that seemed appropriate for palynoforms analysis. Basically, for their extraction all the used methods join in the physical and chemical processing of 1 gram soil sediment [1], [5].

The samples are taken during the September-November 2022 period in Elbasan area and were collected in total 16 samples of soil, starting from 0.25 m to 4 m deepness with the distance between the sampling to 0.25 m.

A. The Erdtman method of acetolysis

Processing of soil samples is carried out based on Erdtman method [13], [14]. So that to get better results first mix 1cm³ soil with 10ml KOH (10%).

Erdtman acetolyze method consists of processing the material with an acetolyze mixture, sulfuric acid (H₂SO₄) and acetic anhydride (CH₃COO)₂ in a 1:9 ratio.

We cleaned with distilled water and mixed it with acetolyze solution, until a neutral environment is taken. The emasculation process is followed by a centrifugal process for three minutes (3000 rotation/minute).

The acetolysis method has found a wide use in paleopalynology; this is mainly related to the fact that the use of this method provides a better visibility on fossil spores and pollen during the microscopic observation process, compared to other methods used. [5]-[7], [13]-[15].

B. Fixing the prepared compounds

The fixture of prepared composites was realized by using the method of glue-preparations through gel-glycerine, which was prepared based on the Kissler method [16] by using 50 gram of gelatine,

175 ml of distillate water, 150-gram glycerine, 7-gram phenol (crystals).

The composite was isolated to the edges of microscope slide with spray or paraffin and after 3 days it was ready to be used and stored.

III. RESULTS

In the Table 1 are given the data about the presence of *Urtica* type palynomorphs, part of Urticaceae family, presence related to the appearance in the relevant depth.

Also are given and the total pollen number for this type.

The maximum palynoforms of *Urtica* type (94 spores per samples) is taken near the surface in 0.25 m deepness while the minimum number, 30 spores, is taken respectively in 3.5 m of deepness.

Table 1. *Urtica* palynoforms according to the deepness

Sample	Depth (meters)	Palynoforms number (<i>Urtica</i> Type - <i>Urticaceae</i>)
1	4	31
2	3.75	32
3	3.5	30
4	3.25	38
5	3	44
6	2.75	47
7	2.5	52
8	2.25	60
9	2	66
10	1.75	64
11	1.5	61
12	1.25	74
13	1	72
14	0.75	83
15	0.5	97
16	0.25	95
Total number of spores		946

From the data analysis, we mainly find a good presence of the number of spores for *Urtica* type from the depth towards the surface.

The total number of *Urtica* type palynoforms is 920 spores.

Except for sample 10 where a downward trend is observed (exactly at 1.75 m depth), the increasing trend for the palynoforms of this type is easily ascertained, especially in the direction and near the soil surface.

IV. DISCUSSION

From the results given in Table 1 for all stations it is found that, all the *Urtica* Type palynomorphs are present at all depths, should be linked with human impact on the cultivation of the *Urtica* type plants.

The increasing trend of the *Urtica* type spores in almost all samples, except 1.75 m deepness where it is a decrease of palynofoms number is detected for this type, probably indicates that in this sustainability of the palynofoms presence may have been influenced by both human and ecological factors.

Climate can cause land use changes or human societies to climate fluctuations cause complex impacts on the environment [5], [18].

Regarding the reason for the permanent presence of representatives of the *Urtica* type over the years, we are mainly of the opinion as follows.

In the literature it is found that the *Urtica* plant has a long history of use mainly in traditional medicine, food, tea and textile raw material in ancient and modern societies [18], [19].

Nettles represent a strong connection with human habitation and buildings. The presence of nettles can indicate the site of a long-abandoned building and is also an indicator of soil fertility [20]. Human and animal waste are responsible for high levels of phosphate and nitrogen in the soil, providing an ideal environment for nettle growth [20], [21].

Fossil records of Urticaceae are scattered and a wide presence of representatives of this family is found over the years and in different places. The base species are representatives of *Urtica* type found in fossil achenes and known from the Late Cretaceous of Central Europe.

In conclusion, we can confidently state that the impact of human activity over the years, mainly on planting useful plants, is the main cause of vegetation changes in the Elbasan.

The current vegetable crown of Elbasani town consists mainly of rich vegetation and fruit trees. The *Urtica* type palynofoms shows its evolution line.

V. CONCLUSION

- *Urtica* type palynomorphs shows an increasing trend from the bottom near to the soil surface.
- Urticaceae family palynofoms are present in all samples belonging to different time.
- Based on the presence of *Urtica* palynomorphs in all samples that correspond to the entire period of the New Holocene period, we think that there have

been no such strong factors as effected vegetation change, and this is mainly dedicated to the human influence in the cultivation of the vegetation necessary for him.

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