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Research Article

Palynological Data for three Genres of Fagaceae Family in Elbasani Region, Albania

Healthcare

Keywords: Palynological, New Holocene-Quaternary, spore, pollen, Fagaceae Family.

Admir Jançe	**University"Aleksander Xhuvani" Elbasan, Albania. Faculty of Technical Medical Sciences.**
Skënder Topi	**University"Aleksander Xhuvani" Elbasan, Albania. Faculty of Technical Medical Sciences.**

Abstract

The study is performed in Elbasani region. A lot of biological studies have been realized in this region during two last decades' periods. Palynological data are reported in the present study, obtained in depositions of last XX centuries (last historic period of New Holocene, last Quaternary), from five representative stations of Elbasani, important and ancient town in the central Albania. This study provides some paleopalynological data about the dispersion of Castanea, Fagus and Quercus representatives of Betulaceae Family during Holocene period in the area where is situated Elbasani region. The aim of this paper is to present the correlation between the depth and dispersion of three genres on different periods of time. For this purpose we took about 16 sediment samples in each station, every 25 cm from the surface up to 4 m depth, through a dry drilling sonde, 110 mm and 130 mm diameter, during 2010. The age is determined based on the age of archeological objects nearby; the depth 4 m is considered to be about 2000 years. Palynological data for these genres were provided for the first time in the Albania's palynological literature. Observations, counting and photos of palynomorphs it was carried on using light microscopes, magnification up to 1000x. According to the analyses of these samples we found out several interesting data that showed clearly the correlation between the depth and number of spores and pollens for these three genres.

Introduction

The given material presents paleopalynological data of Holocene deposits in Elbasan district. Palynology is an Interdisciplinary Science, connected to biological sciences and geology, particularly of botanical science. Pollen and spores can undoubtedly be preserved because the outer wall of the grains is extraordinarily resistant (Kapidani, 1996; Pacini & Franchi, 1978).

Plant microfossils of this family have not been studied previously from any of the localities in Elbasan and there aren't any studies by neither native or foreign authors for spore and pollen content data about these plants in Holocene deposits in our country. (Kapidani, 1996; Kapidani & Jançe, 2004).

Information on the method of collection, preservation and laboratory processing of the pollen grains of these plants were provided by this study as well. This study provides important information about the reconstruction of paleoflora, paleoclimate, stratygraphy of the Holocene, etc (Fegri, 1957; Davis, 1999).

The study in Holocene deposits provides the factors which have their impact on the potential transformation of the flora in Elbasan city, focused on evolution of Fagaceae family. (Kapidani & Jançe, 2004; Muhameti et al., 1984; Moore & Webb, 1978; Shalla, 1983; Jance & Kapidani, 2011; Forest et al., 1999). This study was undertaken with the purpose to show the correlation among the quantities data of spores and evolution over the years for three genres of Fagaceae family.

Materials and methods

During this study we have taken 16 soil samples, starting from 4 meters depth to 0.25 m. The distance between the sampling stations is 0.25 m. Palynological examination of all samples showed that all contained a large amount of organic matter that appeared suitable for pollen analysis. For each soil sample we have prepared 10 microscopic preparations.

The method of acetolysis according to Erdtman

The soil sampling is based on Erdtman method (Erdtman, 1960; 1969). Erdtman acetolyze method consists on processing the material with an acetolyze mixture, acetic anhydride $(CH_3COO)_2$ and sulfuric acid (H_2SO_4) in a 9:1 ratio. In order to get better results first mix $1cm^3$ soil with 10ml KOH (10%). After that we

cleaned it with distillated water, and then we mixed it with acetolyze solution, until a neutral environment is obtained. The emasculation process is followed by a centrifugal process for three minutes (3000 rotation/minute). After that, granules were placed on slide and were observed with a microscope by dropping a drop from glycerin solution and water in a ratio 1:1.

The acetolyze method is widely used in palynology; it gives better visibility over the spores and pollens compared with the other methods used during the microscopic observation process. (Aleshina, 1964; Erdtman, 1960, 1969; Kapidani, 2005; Kapidani & Jançe, 2004; Moore & Webb, 1978; Davis, 1999; Jance & Kapidani, 2011). We then use this method to assess the paleoclimate and paleoelevation represented by the assemblage and will discuss the results in terms of their implications for the uplift history of the Elbasan region.

Fixture of prepared composites

The fixture of prepared composites was realized by using the method of glue-preparations through gel-glycerin. The gel-glycerin was prepared based on the Kisser method (Kisser, 1935) by using 50gr of gelatin, 175 ml of distillate water, 150gr glycerin, 7gr phenol (crystals). Once the distillate water was heated up to 50^{o}C, the gel was dropped into it. It was mixed up several times till melted properly. Then the glycerin and the composite were added and boiled till the liquid became thicker and viscose. After the phenol was added to the mixture, a uniform melted composition was taken. The prevention of air bubbles that might emerge during the process of composite preparation was made by warming up in advance all equipment used over the process. The final 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.

Results and Discussions

On table 1 are presented the data about the number of spores for both three genres of Castanea, Fagus and Quercus Typ, representatives of Fagaceae family according to the depth. Also is presented and the total number of spores for each of four genres.

The maximum number of spores of Castanea Typ (31 spores per sample) is taken in 0.25 m of depth while the minimum number is taken in 4 m of depth.

Regarding to the Fagus Typ the maximum number of spores (22 spores per samples) is taken in 0.75 m of depth. While for Quercus Typ, the maximum number of spores (respectively 78 spores per samples) also is taken close to surface, 0.25 m of depth.

Table 1.Number of spores according to the depth

Sample	Depth (meters)	Number of spores (Castanea Typ)	Number of spores (Fagus Typ)	Number of spores (Quercus Typ)	Total number of spores according to the depth
1	4	13	10	34	57
2	3.75	15	15	41	71
3	3.5	14	9	45	68
4	3.25	18	12	49	79
5	3	15	15	51	81
6	2.75	13	13	52	78
7	2.5	17	13	57	87
8	2.25	20	14	65	99
9	2	18	13	63	94
10	1.75	27	16	66	109
11	1.5	22	21	66	109
12	1.25	21	17	69	107
13	1	22	19	71	112
14	0.75	26	22	71	119
15	0.5	26	19	74	119
16	0.25	31	20	78	129
Total number of spores		318	248	952	1518

On figure 1 is clearly shown the increasing number of spores of the three representatives of Fagaceae family from the bottom to the surface, in particular this increase is visible for Quercus Typ. On figure 1 is clearly shown the upward trend of number of spores of Fagaceae family from the bottom near to the surface, also is clearly shown the increasing number of spores for this family above all near to the surface.

Based on the data presented in table 1 and figure 2 the spore's total number of Fagaceae family is 1518 spores. (Figure 2).

In sample 15 and 16, the number of spores of Fagaceae family, for Castanea and Quercus Typ, undergoing an immediate increase. (Photo 1, 3). The data show that the increase of the representative's presence of family Fagaceae near to the surface should be associated with human impact on the cultivation of this family plant, above all as regards Castanea Typ. (Group of authors, 2003).

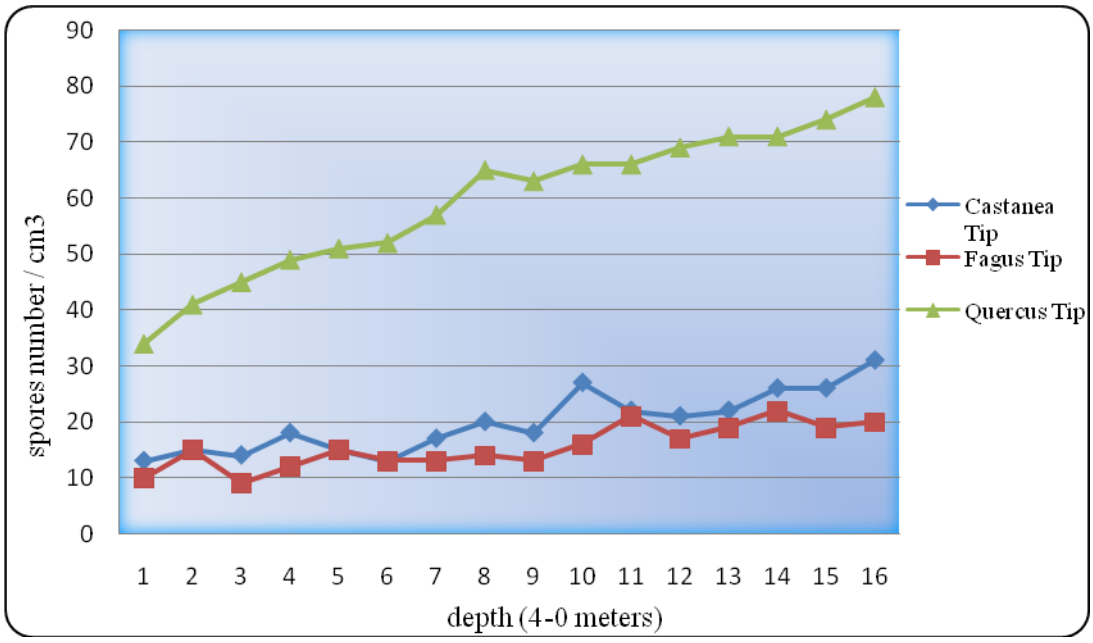


Figure 1. The spore's dispersion for three Genres of Fagaceae family according to the depth

As shown in Figure 1, all Fagaceae family forms, from the bottom toward the surface is increasing their overall presence. One of the reasons for this increase may be related to the fact that new forms of pollen are stored better than older ones to meet the depths samples. But in this storage may have affected the ecological factors.

Based on the data presented in table 1 and figure 2 the spore's total number of Quercus Typ is greater from all others, followed by Castanea Typ and with time Fagus Typ, respectively 952, 318 and 248 spores. (Figure 2). Also it notes that all palynophorms are present at all depths.

We believe that the trend towards increasing the pollen in the samples should be related to the impact of agricultural policies over the years to increase the plantation of fruit trees, especially chestnut and other plants cultivated associating with them.

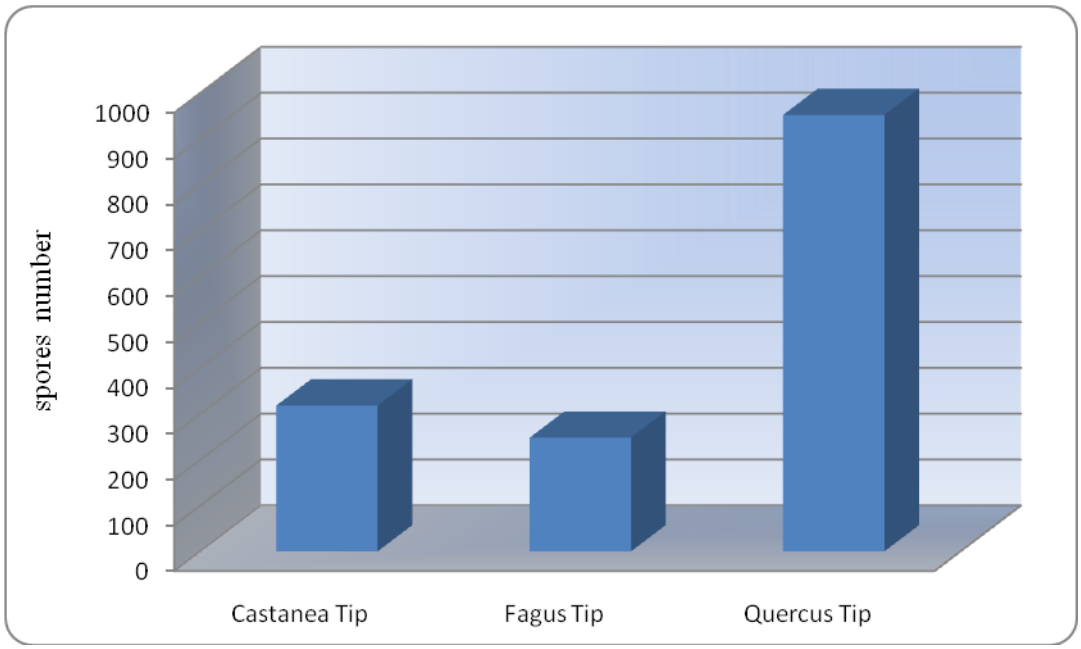


Figure 2. The total number of spores according to three Genres of Fagaceae family

The dispersion rate of Castanea spores for different samples is presented (Figure 3):

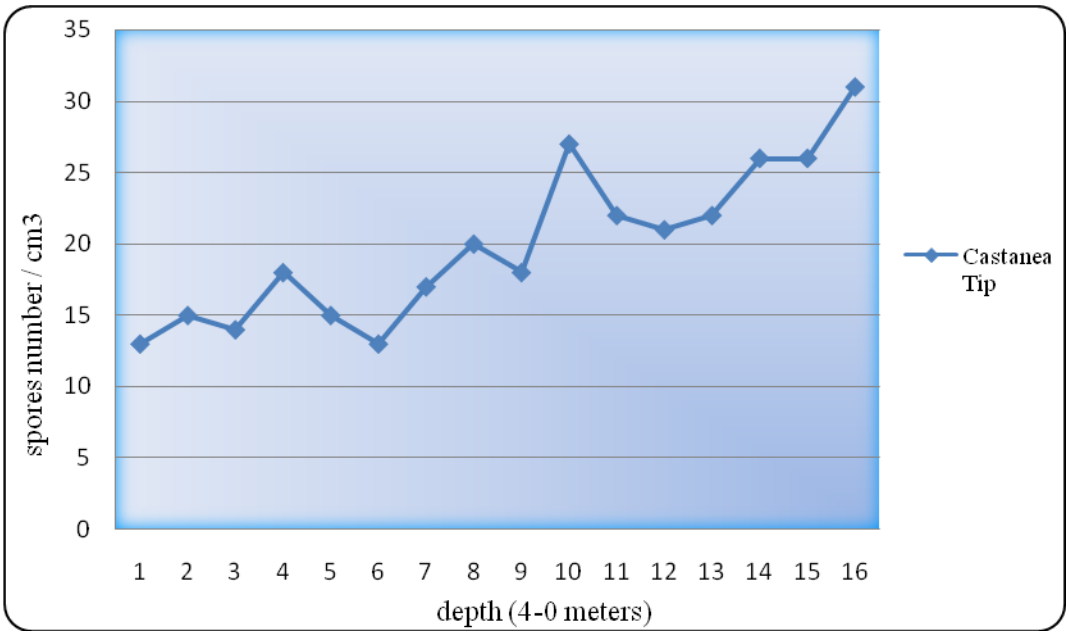


Figure 3. The spore's dispersion of Castanea Typ according to the depth

In the figure 4 is presented the dispersion spores of the Fagus from the bottom to the surface (Photo 2).

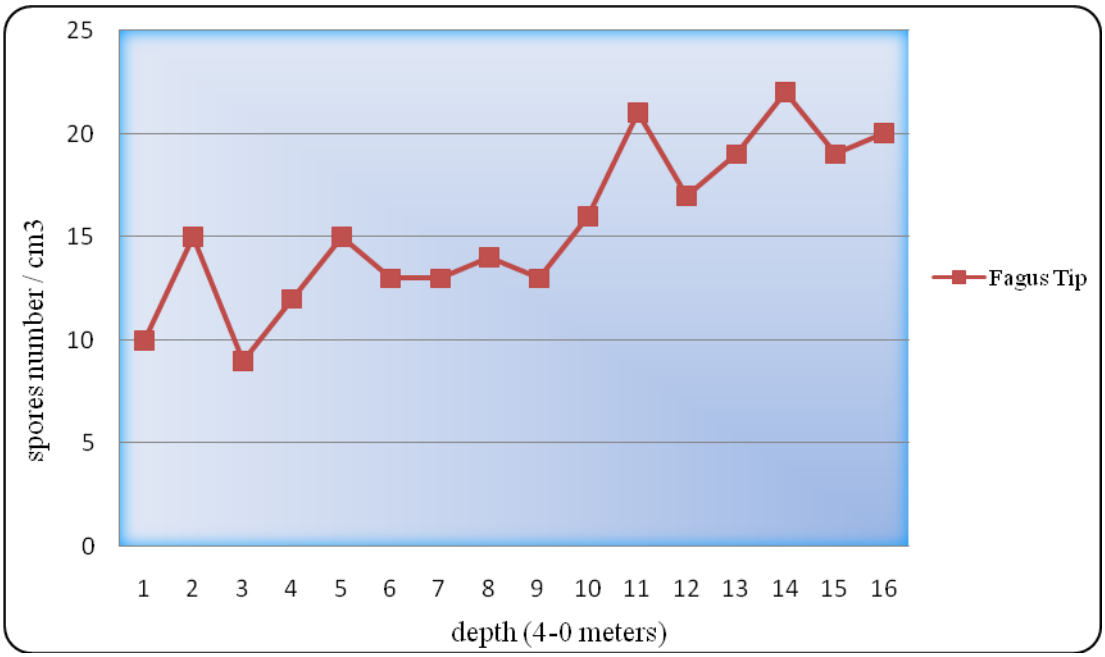


Figure 4. The spore's dispersion of Fagus Typ according to the depth

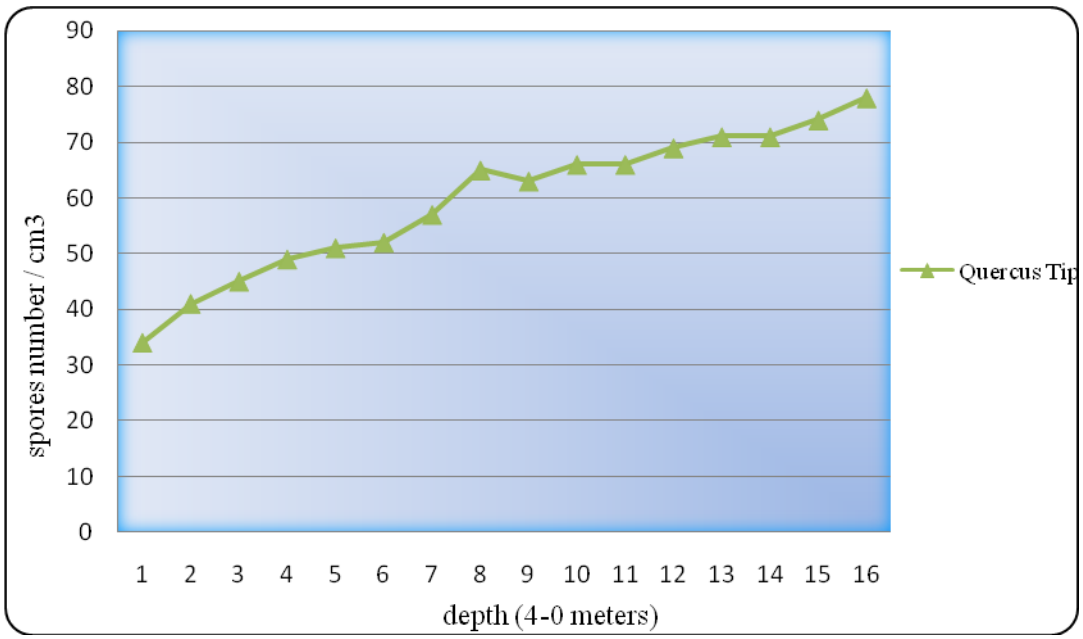


Figure 5. The spore's dispersion of Quercus Typ according to the depth

In the figure 5 is presented the dispersion spores of the Quercus from the bottom to the surface (Photos 3).

So there is an upward trend, which is associated with the best chance of saving them from the bottom to the surface deposits. Interesting is the fact that the samples matched depths approximately 2-1.5 m with years 900 to 1200, the number of pollen is smaller than in years about it, despite the general trend of their growth. Unable to find data on climatic factors, are supported in medieval history of Albania (Hasanaj et al., 2004), in

which it is alleged that this period was associated with wild wars of extermination of the Bulgarian and Serbian occupation where the population the area is greatly reduced and the city loses the economic importance.

Given the presence of particles carbon micrograins in the sample we believe that herbal landscape of the city of Elbasan, as a result of the war would have suffered devastation from massive burns and consequently for its reconstruction probably had plenty of time.

We believe that the trend towards increasing the pollen in the samples, especially those shrubs-trees, should be related to the impact of agricultural policies over the years to increase the plantation of fruit trees, especially cultivated plants and associating with them.

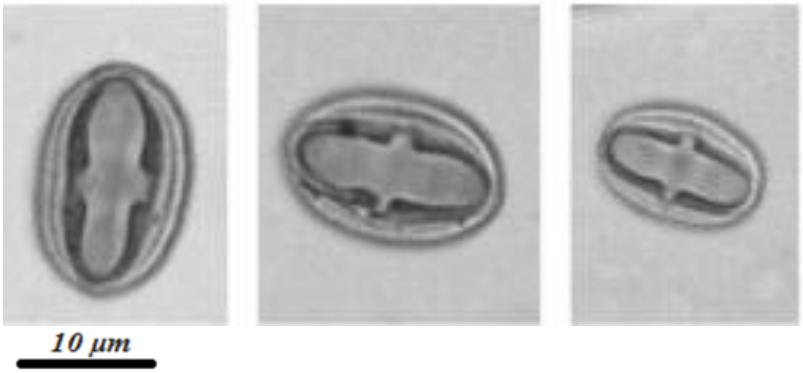
Elbasan city crowns today is mainly composed of olive plantations associated with fruit trees and a rich vegetation grass, the major part of which is cultivated. The impact of human activity is the main cause during the crowns transformations of Elbasan city.

By analyzing the data we can conclude that Elbasan with its surroundings represents typical Mediterranean shrub vegetation.

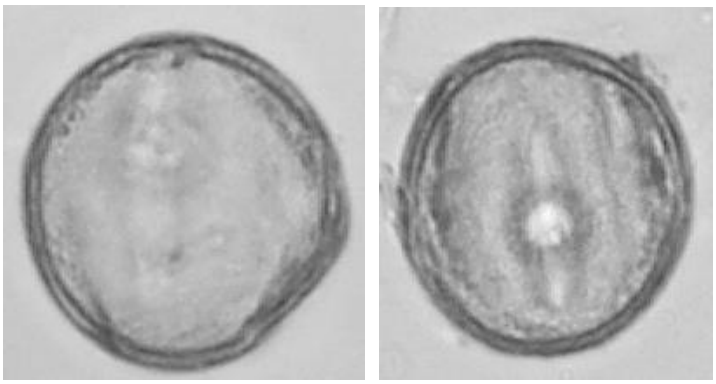
Conclusions

1. The three representatives of Fagaceae family are present for depth 4 meters up near the surface 0.25.
2. The spore's number to three representatives of Fagaceae family from the bottom toward the surface is increasing their overall presence.
3. The total numbers of spores for Quercus Typ are greater than this of Castanea and Fagus Typ.
4. Elbasani is represented by Mediterranean maquis, associated with fruit trees of crop plants that reflect the social-economic development of the town during 2000 years.

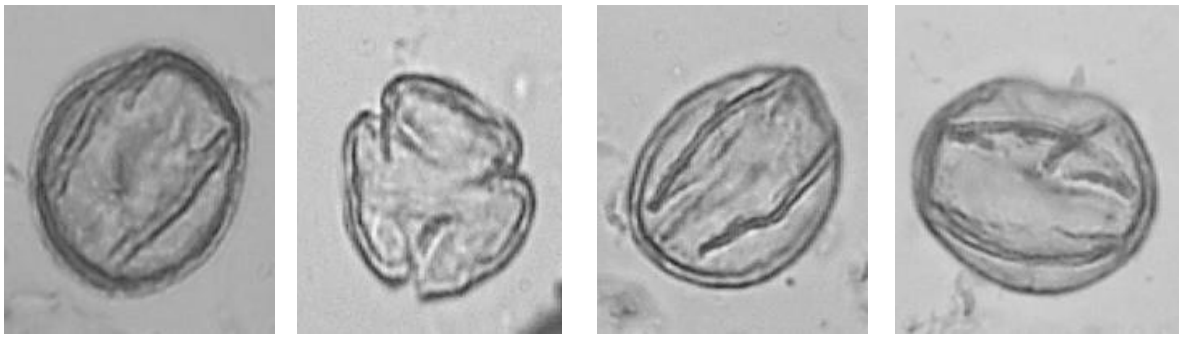
Appendix 1. Microscopic photos



Ph.1. Castanea Typ Pollen



Ph.2. Fagus Typ Pollen



Ph.3. Quercus Typ Pollen

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