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Research Article

Palynological study of spores of the species *Selaginella denticulata* L, (*Selaginellaceae* Willk) in Albania

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Abstract-*Selaginella denticulate* L. (*Selaginellaceae*) is a heterosporous herbaceous plant. The article provides data on the morphological study of the microspores of this species from our country. At the same time, we compare the palynological data of our species with those obtained from the literature. The microspores are of the triradiate type, with circular to triangular contours. The perispore is not developed. The exine is with verrucate formations and is about 2 μm thick. The aperture is triradiate or trilete with wavy edges.

There is no data on this species in the local palynological literature. Through this study, more information is provided on the morphological features of the microspore grains of this species from our country compared to those in the literature.

The material for the study was taken fresh in the Saranda area, south Albania. The study was done with a Motic BA310 light microscope with 400x and 1000x magnification.

Keyword: Selaginella, Microspore Grains, Aperture, Exine.

I. INTRODUCTION

The genus *Selaginella* (Beauv) in Albania is represented by a small number of species. In the Flora of Albania Vol 1 two species are described, *S. selaginoides* (Beauv) and *S. helvetica* (L). Paparisto et al (1988). Later it was also reported *S. denticulate* (L) by Barns (1997), Rakaj et al (2013), Barina et al (2017), Vangjeli (2017). We have collected it in the Saranda district in 2024. The three above-mentioned representatives of the genus *Selaginella* (Beauv) are heterosporous herbaceous plants. The macrospores are formed in yellow-

green macrosporangia. They are located at the base of the macrosporophyllous leaf. In each macrosporangia 4 macrospores are formed. (Fig.4).
Microspores are formed in red microsporangia and are located at the base of the microsporophyll leaf.. (Fig.5). The number of microspores is large and they are easily dispersed by the wind. They are an important source of palynological information. Therefore, in this paper we have presented only the morphological study of microspores. Microspores are tetrahedral in type, with triangular circular contours.. The exine is verrucate and relatively thick. The aperture is trilete. The perispore is not developed.
In the palynological literature of the country, data are given only for *Selaginella helvetika* L. Kapidani (1996). The article provides data on the morphological study of microspores of our country's species *Selaginella denticulata* L. For the palynological description we consulted with For the palynological description we consulted the authors Avetisjan (1950), Agashe (2009), Alen (2024), Bobrov (1983): Dennise (2016), Erdtman (1965), Kramer (1990), Nayar (1964), Szczęśniak (2013), Tryon (1991), Vaganov (2019).

II. MATERIAL AND METHODS

The material for the study was taken fresh in southern Albania. *Selaginella denticulata* (L) was found on the sandstone rock of a hill in the village of Bistrica, Saranda, by Meço in February 2024. It was found in the shade, within a dense maquis formation, dominated by Phillyrea latifolia (L). It was located at an altitude of 70 meters above sea level. The coordinates of the location are 39°54'51.1"N, 20°07'51.3"E,
A variety of processing methods can be used to study the morphological characteristics of microspore grains. The results of palynological studies of spores depend to a large extent on the method of chemical processing. Also, cracks and deformations of the spores are observed during chemical processing. It is therefore recommended to use more than one processing method. In our work we have chosen the alkaline method.

- *Alkaline method*

This method consists in processing the material with KOH or NaOH at a concentration of 10%. The spores are boiled in the alkaline solution for 2-5 minutes and are constantly checked under the microscope so that they do not turn dark. After we have reached the right color, we rinse the material with distilled water several times until the neutral environment is reached. Rinsing is done by decantation and centrifugation. After rinsing, the preparation is closed with glycerin gelatin.
Fiksimi dhe përgatitja e preparateve të gatshme është bërë me xhelatinë glicerinë sipas metodës Kisser (1937). The terminology used is based on that recommended by Erdtman (1965), Punt.et al. (1994) and Kapidani (1996, 2005) The palynological features analyzed in this paper are: classification by type, shape, size, aperture characteristics, exine sculpturing, etc. For the study of microspore grains, a Motic BA 310 light microscope was used. Measurements and microscopic photographs were taken at 400X and 1000X magnification.

III. RESULTS AND DISCUSSIONS

Family *Selaginellaceae* Willk
Genus *Selaginella* Beauv
Species *Selaginella denticulata* (L.) Spring, lok. cit. (1838).

In Flora Europae (Tutin et al.1993) *Selaginella denticulata* (L.) is described: Stem 4-10 cm, creeping, flattened and dorsiventral, not articulated, very slender, much-branched. Leaves up to 2.5 mm, dimorphic, 4-ranked, the lower larger, ovate, acuminate, markedly dentate and slightly asymmetrical. Strobili not more than 2 cm, sessile, not sharply defined at the base. 2n = 18. *Mediterranean region; Portugal*. Al Bl Co Cr Ga Gr Hs It Ju Lu Sa Si.

The Selaginella denticulate found by us has a length of up to 8 cm and long rhizophores. (Fig.1,2)

Fig. 1.2. Photo of *Selaginella denticulate* L measuring 8 cm, with rhizophore and strobilus. Sarandë, February 2024.

In Strobili, macrosporophylls with yellow to green macrosporangia are distinguished. While in microsporophylls, red microspores are distinguished. (Fig. 4.5.)

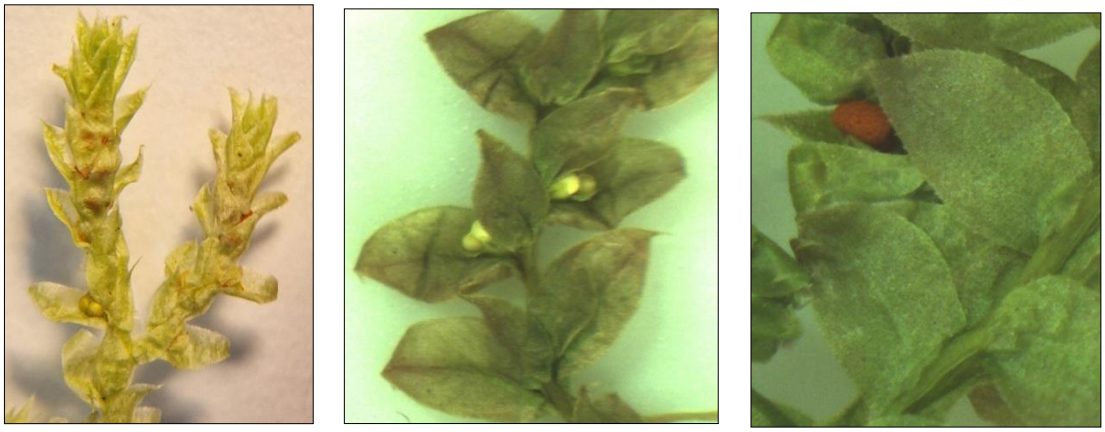

Fig 3. 4. 5. Photo of Selaginella denticulate L strobilus with yellow-green macrosporangia located at the base of the macrosporophyllous leaf and red microsporangia located at the base of the microsporophyllous leaf.

The spores are of the tetrahedral type, with amb circularis triangularis. The amb of the spores is usually convex, but there are also spores with straight and concave amb, with rounded angles. The aperture is a

trilete mark. Laesura is undulations and with well-developed margo. They reach up to the contours of the spore. During chemical processing, the commissura breaks and the spores open. (Fig. 6)

The exine has verrucate formations. They are distributed unevenly on the surface of the exine. Verrucate formations give the contours of the spore small undulations. The thickness of the exine together with the verrucate formations varies between 2 - 3 μm.

The diameter of the spores varies from 28-31 (29) μm. The color after treatment with KOH is brown. (Fig.6-11)

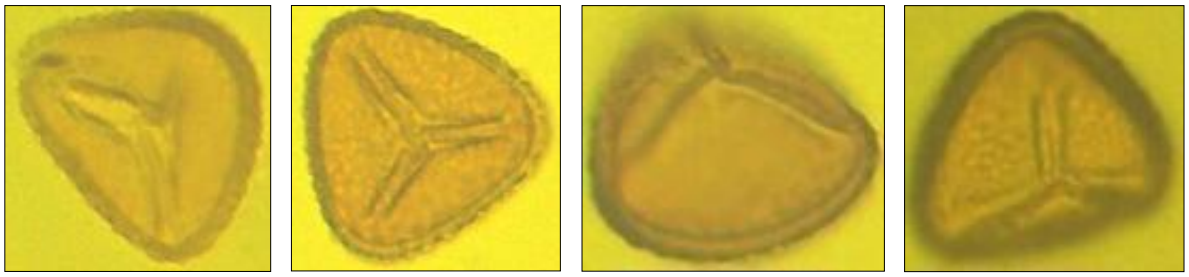

Fig 6-9. Photo of Selaginella denticulate L spores with Motic BA310 light microscope at 400x magnification

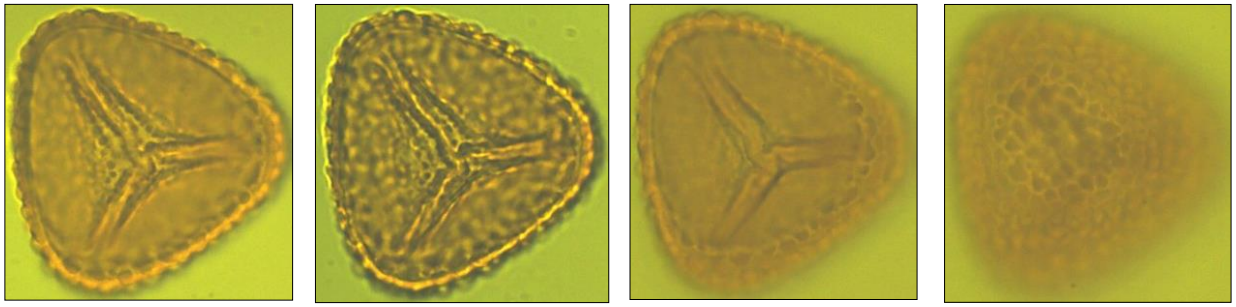

Fig 10-13. Photo of Selaginella denticulate L spores with Motic BA310 light microscope at 1000x magnification

IV. CONCLUSIONS

Species *Selaginella denticulata L* The aperture is a trilete mark. Laesura is undulations and with well-developed margo. The exine has verrucate formations.

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