

Pollen Morphology of *Eupatorium cannabinum* L.

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ABSTRACT

In this paper, pollen morphology of *Eupatorium cannabinum* L., belonging to the aromatic genus *Eupatorium* L. (Asteraceae), which has widely medicinal use, were examined with light microscope (LM). According to the investigation, pollen grains of the species is radially symmetrical, isopolar, oblate-spheroidal, tricolporate and echinate. In our opinion, the palynological features of the taxon might be helpful to investigate the taxon in various palynological, taxonomical and pharmaceutical researches.

Key words: Asteraceae, *Eupatorium cannabinum*, light microscope, palynological, taxonomical researches.

Introduction

Eupatorium is one of the two largest genera in the Asteraceae family. The genus *Eupatorium* belongs to Eupatorieae, one of the 13 tribes of Asteraceae, and comprises of nearly 1200 species distributed mainly in the tropical regions of America, Europe, Africa, and Asia [1]. *Eupatorium cannabinum* L. is a herbaceous plant common in Europe, Central Asia and North Africa, preferring damp places near water. *E. cannabinum* is located in the Thracia, Blacksea and Mediterranean region of Turkey (Figure 1). It shows a strain of up to 1.5 m high, leaves with 3-5 sections having unevenly toothed leaflets, pubescent and white or pink flowers, gathered in corymbiform calathidiums [2]. *E. cannabinum* are pollinated by bees, flies, beetles, lepidoptera, self.

Asteraceae occur in all habitats, and can be found in flower throughout the year in

most of the state. Abundant honey has been obtained from *Aster* spp., *Baccharis* spp., *Liatris* spp., *Solidago* spp. and *Eupatorium* spp. [3,4]. Bastos et al. determined [5], botanical origin of 14 honey bee (*Apis mellifera*) pollen load samples acquired in shops and apiaries in Minas Gerais and São Paulo states, in Brazil, and *Eucalyptus* (Myrtaceae) and *Eupatorium* (Asteraceae) pollen types were the most common among those sampled. Tiwari et al. [6], declared pollen analysis of 21 samples of rock bee (*Apis dorsata* F.) honey revealed the pollen grains belong to *Eupatorium* of Asteraceae from Garhwal Himalaya, India. *E. cannabinum* which is an important plant for bees have been also used by people for various medical purposes.

In Europe, *E. cannabinum* is a species commonly used in traditional medicine as

a good choleric, laxative, diuretic and hypocholesterolemic [7]. It is also used to treat skin diseases such as psoriasis, eczema, boils [8]. *E. cannabinum* has been extensively used by natives for treatment of malaria, fever and flu in India [9]. Ribeiro-Varandas et al. [10], indicated cytotoxic effect of *E. cannabinum* ethanolic extract against colon cancer cells and interactions with Bisphenol A and Doxorubicin.

Material and Methods

Locality

Materials of this study were collected in 2014 from Giresun University-Güre campus. Giresun is located in the eastern part of the Black sea region (40°54'K and 38°25'D). According to the grid system applied by Davis [11], Gure (Giresun) is located in the A7 frame.

Pollen Sample

The light microscopy (LM) observations with their measurements were made on pollen from mature anthers, which have been prepared according to the wodehouse method [12]. The measurements of the pollen grains of *E. cannabinum* were taken on 30 pollen

grains from the species by an immersion object-lens (x100) and a scale ocular (10x). In addition, the ornamentation were established. All the statistical analyses of the palynological characters were made by the SPSS package program. The terminology used is of Erdtman [13] and Punt et al. [14].

Result and discussion

The pollen grains of *E. cannabinum* are radially symmetric, isopolar, tricolporate, oblate spheroidal (Figure 2). The polar axis is 19.17 μm and equatorial axis 21.83 μm . In polar view, the pollen grains are circular, amb diameter is 21.37 μm . The apocolpial area is wide. The distance between colpi ends is 11.30 μm . The colpi are long and with distinct margin; Clg 15.27 μm , Clt 4.27 μm . The pori are circular and with distinct margin; Plg 4 μm , Plt 4.40 μm . The exine is 2.23 μm thick (sexine 1.23 μm and nexine 1 μm). Sexine and nexine are so similar in thickness. Exine ornamentation is echinate. Spine length is 2.4 μm and spine base is 2.27 μm (Table 1).

The Asteraceae has pollen that is basically radially simetric, isopolar and tricolporate. Pollen morphology of *E. cannabinum*

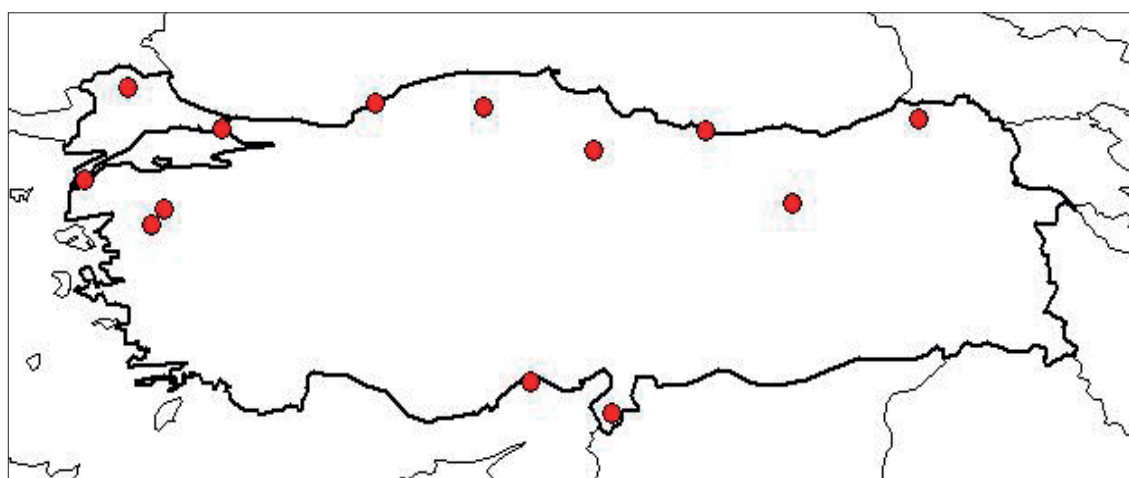


Figure 1. Geographical distribution of *Eupatorium cannabinum* in Turkey (<http://www.tubives.com>)

Table 1. The palynological measurements and observations of the *Eupatorium cannabinum* L. pollen (P: polar axis, E: equatorial diameter, Amb: diameter of polen at the polar view, Clg: length of colpus, Clt: latitude of colpus, Plg: length of porus, Plt: latitude of porus, t: distance between colpi ends, M: median, Var.: variation, S: standart deviation).

Taxon	shape	P/E	Polar axis (μm)			equatorial diameter (μm)			Amb (μm)			Exine (μm)		Sexine (μm)		Nexine (μm)		Clg/ Clt	Clg (μm)	Clt (μm)	Plg/ Plt	Plg (μm)	Plt (μm)	t (μm)	Aperture
			M	S	Var.	M	S	Var.	M	S	Var.	M	Var.	M	Var.	M	Var.								
<i>E. cannabinum</i>	Oblat-siferoid	0.88	19.17	± 2.48	20-28	21.83	± 1.70	22-30	21.37	± 1.71	18.25	2.23	2-3	1.23	1-2	1	1	3.58	15.27	4.27	1,1	4	4,40	11,30	3-Colporate

is in compliance with the pollen features of Asteraceae family. But, Literature on the pollen morphology of the taxa belong to *Eupatorium* and even on the tribe Eupatorieae within Asteraceae from Turkey has been poorly published.

E. solidaginifolium and *E. monanthum* have grains which measure $15\mu\text{m}$ in diameter. *E. solidaginoides*, have grains $20\mu\text{m}$ in diameter, while those of *E. calophyllum* and *E. calaminthaefolium* are about $30\mu\text{m}$. Size of *E. cannabinum* pollen grains is $19.17-21.83\mu\text{m}$. Pollen grains of *E. cannabinum* and *E. solidaginoides* are in similar size.

The spines of *E. monanthum* are about $0,5\mu$ high and $1,5\mu$ in basal diameter. Those of *E. calophyllum* are $3,5\mu$ high and 4μ in basal diameter are often curved or hooked [15]. *E. cannabinum* is $2.4\mu\text{m}$ high and $2.27\mu\text{m}$ in basal diameter. According to the dimensions of the spin *E. cannabinum*, between *E. monanthum* and *E. calophyllum*.

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Eupatorium cannabinum L. Poleninin Morfolojisi

Öz: Bu araştırmada, geniş medikal kullanımı olan aromatik *Eupatorium* L. (Asteraceae) cinsine ait *Eupatorium cannabinum* L. polen morfolojisi ışık mikroskobu (LM) ile incelenmiştir. Yapılan incelemelere göre, bu taksona ait polenler radyal simetrik, izopolar, oblat-siferoid, trikolporat, ekinat özellik göstermektedir. Bu taksonlara ait palinolojik özelliklerin çeşitli palinolojik, taksonomik ve farmasötik botanik çalışmalarında taksonların daha doğru teşhis edilmesine yardımcı olacağını düşünmekteyiz.

Anahtar Kelimeler: Asteraceae, *Eupatorium cannabinum*, ışık mikroskobu, palinolojik, taksonomik araştırmalar.

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