

Pollen Morphology Studies on *Euphorbia peplus* L. (Euphorbiaceae)

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ABSTRACT

The family of Euphorbiaceae is represented about 330 genera and 8.900 species in the World. It has wide distribution in tropic and subtropic regions. Especially tropic taxa are in the form of shrubs or trees. The most known genus of Euphorbiaceae is *Euphorbia* L. that is include annual, biannual and perennial taxa. *Euphorbia* is represented about 2150 taxa in the World and 120 of these are also naturally distributed in Turkey. 18 of these taxa are endemic to Turkey. Within palynological investigations in recent years, confusions between species and subspecies taxa were substantially resolved. However only palynological investigations are not enough to resolving this confusion. But they are usefull herper of classic taxonomy. For solve the taxonomical problems with palynological data in species and subspecies level, palynomorphological and ornamentation characters are accepted as diagnostic features. In this study, it was found that the *Euphorbia* taxon was tricolporate type and spheroid shaped and showed a ornamentation of tectate and rugule.

Keywords: Pollen, Morphology, *Euphorbia peplus* L.

INTRODUCTION

Euphorbia L. genus, which is represented by approximately 330 genera and 8900 species in the world, is the richest genus of the family with approximately 2150 species. In Turkey is represented by 120 taxa, 18 are endemic to Turkey (Erdoğan et al. 2012). It's species are found throughout the world, but a remarkably higher diversity is found in arid habitats in the tropics (Govaerts et al. 2000; Radcliffe-Smith, 2001).

Euphorbia species are mostly known for the latex contained in the branched secretion tubes and the Turkish name "sütleğen" at is referred to this situation (Küçük, 2011). *Euphorbia*'s latex which has irritant properties and has a strong laxative effect contains resin, rubber, starch, cyanide and enzymes (Luković, 2009).

If a latex injury leaves the plant, it clots. This has two benefits to the plant. In this way, while the wound area is closed, on the other hand, the attack of bacteria and fungi is prevented due to the antiseptic properties of latex (Yentür, 2003).

In various provinces of Turkey, some of *Euphorbia* species have been used in folk medicines to treat some diseases such as skin illnesses and wounds, wart cures, intestinal parasites, migraines and gonorrhoea (Tang et al. 2012).

Palynological studies reveal that the characters of pollens are useful in the phylogenetic study of the plants these characters are reliable and fixed reproductive characters. Most remarkable variation is found in the, apertural types shape class and tectal surface. The pollen morphology of Euphorbiacea is significantly

helpful at the generic, specific level and subfamilial level (Sultan et al. 2003). The pollen grains of tribe Euphorbieae have a special apertural sporoderm (Suárez-Cervera et al. 1995, 2001). This sporoderm has an intine structure apparently not found in any other family. The pollen grains are 3-colporate, prolate or subprolate, with a perforate, microreticulate or reticulate tectum. The colpi are long and the endopore may be longitudinally or transversely elongated. The most remarkable observation regarding these pollen grains is the special structure of the inner layer (intine) of the aperture. The aperture has a characteristic structure with paired thickenings, one on either side of the colpus. These thickenings are, however, thinner beneath the central area of the colpus. The arrangement and structure of the intinous thickenings varies depending on the distance from the endopore. The apertural system includes a well-developed spongy endexine layer in the centre of the aperture that provides resistance and protection during periods of desiccation (Suárez-Cervera et al. 1995, 2001).

The apertural endexine of the *Euphorbia* is also a characteristic feature not seen in that form in any other genus (Saad and Ghazaly, 1988).

This study aims to identify taxonomic problems between closely related taxa and obtained data from this study will contribute into taxonomic data which will be used in further studies.

MATERIALS AND METHODS

Pollen material was obtained from the Eskişehir Osmangazi University Faculty of Science and Art Herbarium (OUFE). For LM pollen grains were prepared according to the methods of Wodehouse (1935) and Erdtman (1969). LM observations of non acetolysed and acetolysed pollen were made using a Prior microscope. Non-acetolysed and acetolysed pollen were photographed with a Spot in-sight colour digital camera on an Olympus microscope equipped with an apochromatic 100× oil immersion objective and compensating 10× eyepieces. Pollen diameter, pore diameter, distance between 2 pori, and exine and intine thickness measurements were made with 50 pollen grains so that the resulting data would follow Gaussian curves. Pollen from each species was mounted on stubs using double-sided adhesive tape. Each sample was coated with a 100-Å-thick layer of gold in a Polaron SC7620 rotating and tilting vacuum coating apparatus for 60 s, and scanned using a JEOL 5600 LV SEM with 20-kV accelerating voltage (Walker 1974; Walker 1974). Basic palynological books and studies were used for identification of pollen grains (Wodehouse, 1935; Erdtman, 1969; Walker 1974; Walker 1974; Kuprianova, 1967; Aytug, 1971; Faegri, 1975; Moore et al. 1991; Punt, 1984; Pehlivan, 1995)

RESULTS AND DISCUSSION

Pollen grains of all investigated *Euphorbia* taxa in this study identified as tricolporate and spheroidal shaped. Also they have tectate and rugulate ornamentation. In *Euphorbia peplus* exine structure was tectate-perforate, medium reticulate. The reticulum was relatively heterobrachate, and lumina were circular or polygonal, very spacious and deep. The colpi were superficial.

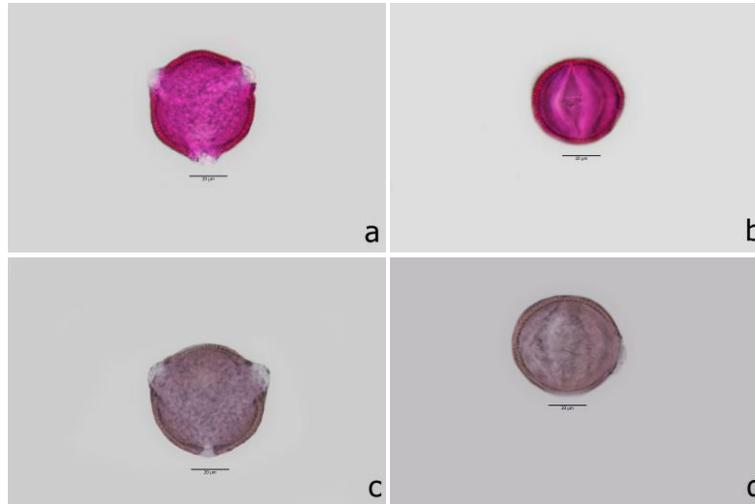


Fig. 1. Light microscope microphotographs of *E. peplus* (a: polar view (W) b: equatorial view (W), c: polar view (E) d: equatorial view (E)).

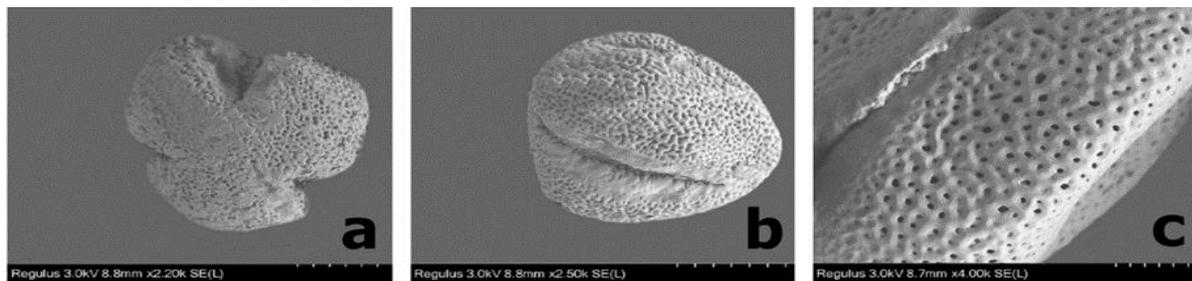


Fig. 2. SEM of pollen grains in *Euphorbia peplus* a: Polar view; b: Equatorial view; c: Exine structure

Table1. Pollen morphometrical parameters of *Euphorbia peplus* (μm); (P: Polar axis; E: Equatorial axis; M: mean; S: Standard deviations; clg: corpus length; clt: colpus width; Ex: exine; I: intine).

	P			E			P/E	clg			clt			Ex.			I		
	M	S	Var.	M	S	Var.		M	S	Var.	M	S	Var.	M	S	Var.	M	S	Var.
<i>E. peplus</i> var. <i>peplus</i> .(W)	35,21	1,62	38-32	33,22	2,22	40-30	1,09	28,68	1,21	30-26	15,76	2,29	18-13	1,54	0,28	0,6-0,1	0,71	0,03	0,5-0,03
<i>E. peplus</i> var. <i>peplus</i> .(E)	32,07	1,78	35-30	32,53	1,54	35-30	1,03	25,26	1,58	27-23	14,91	1,72	18-12	1,05	0,02	0,4-0,1			

CONCLUSION

Emphasized as in literatures, aperture features and exine structure are located between essential criteria which are used for identification of phylogenetic relationships between species (Anefrod, 1960; Cronquist, 1968; Moore, 1991; Punt, 1984; Pehlivan, 1995). Obtained data from this study revealed that, all palynological differences between these studied *Euphorbia peplus* have parallels with genetic differences (Figure 1-2, Table 1) (Anefrod, 1960; Cronquist, 1968; Takhtajan, 1980; Punt, 1984).

We believe that, morphological characters of pollen grains are useful tools as in systematical characteristics of taxa. Also this study will made contribution to the identification of phylogenetic relationship between investigated taxa.

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